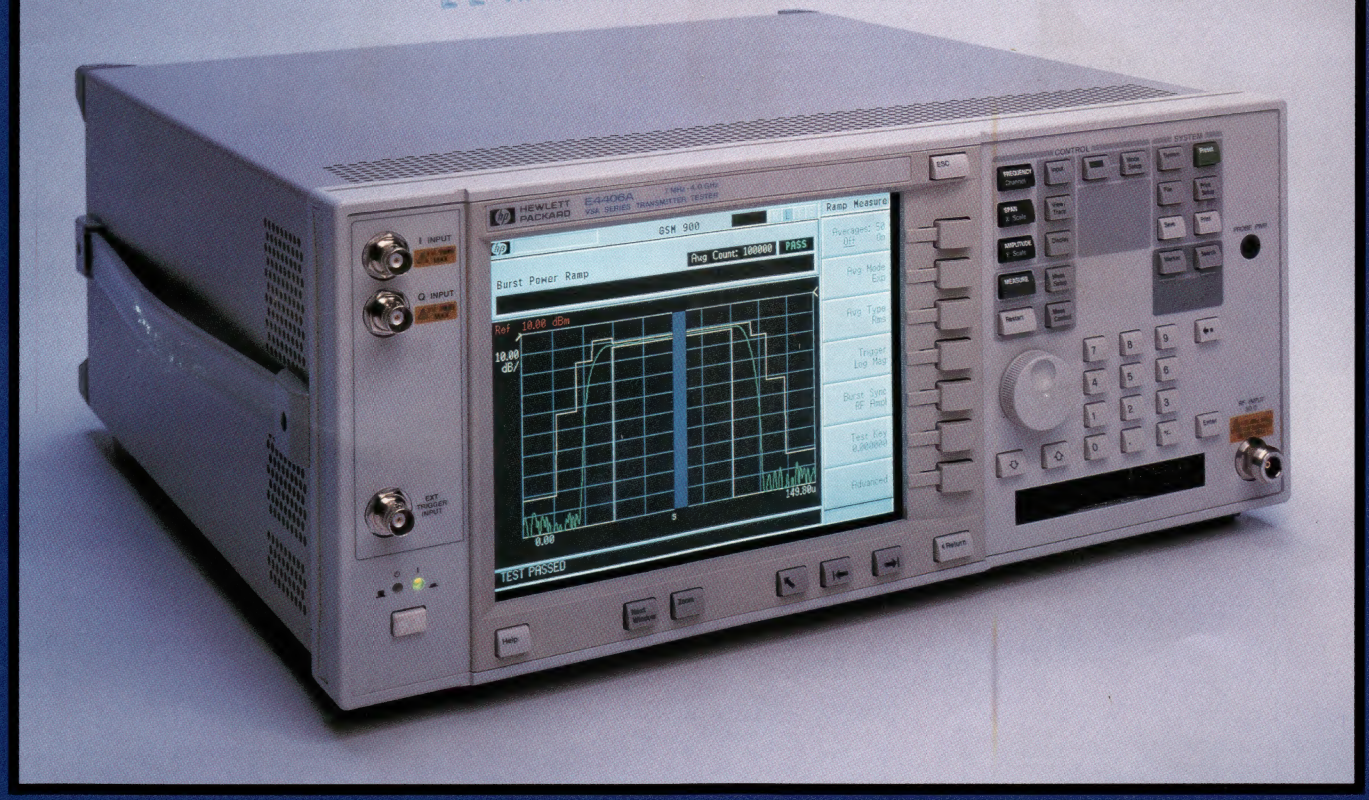
Australian
ELECTRONICS ENGINEERING

Vol.32 No3

MARCH 1999

Hewlett-Packard tests GSM and cdmaOne



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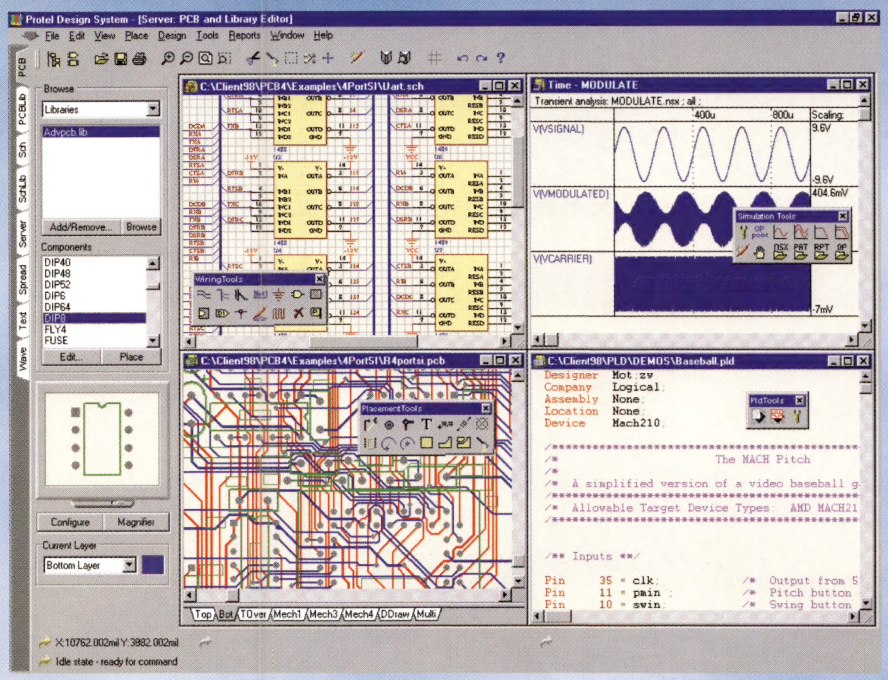

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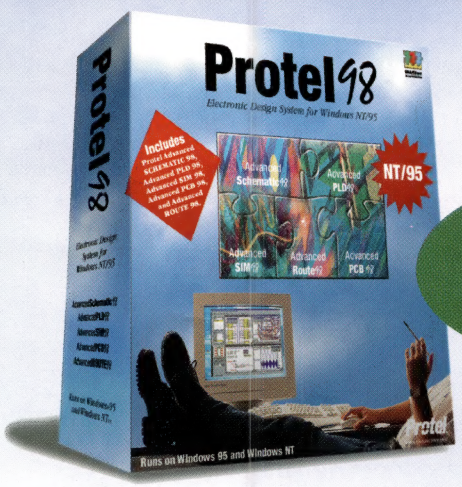

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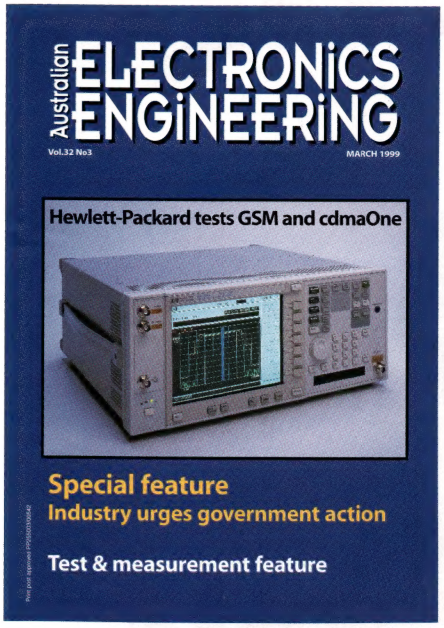

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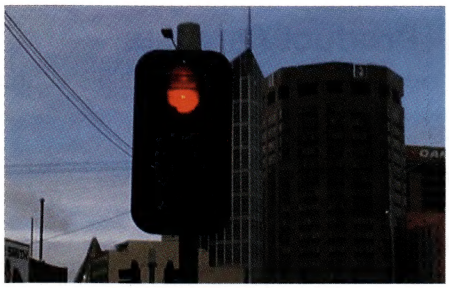

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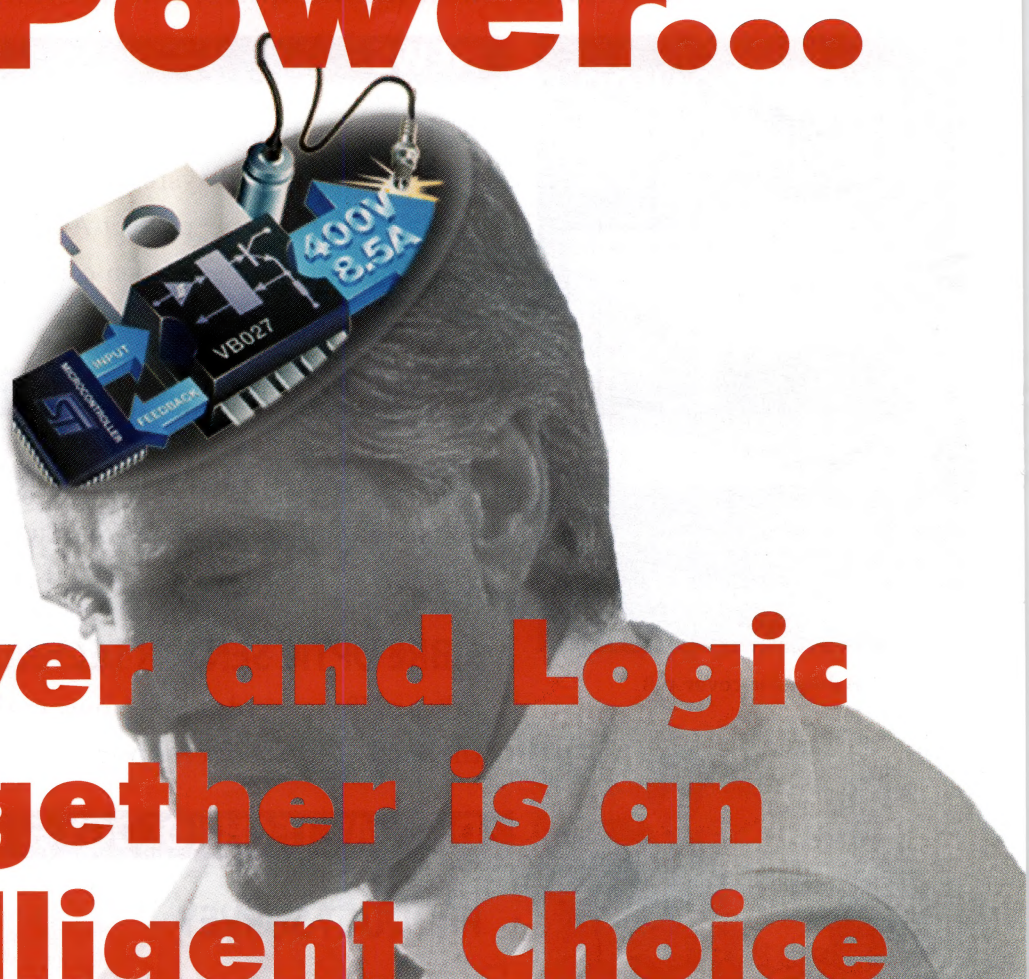
VIPower...



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LOOKING SMART AND LOOKING GOOD

In my January editorial, I predicted a good year for the industry. I am even more confident of this after speaking to many people in the industry for our feature *Where to for electronics in Australia?* (see p.34). The positive comments I heard about the current state of people's business were truly heartening.

I also read some heartening comments from one of our sister magazines *Electronic Business Asia*. Given that the problems in the Asian economy were fuelling some of the nervousness in the local industry, this too augurs well for a healthy 1999. It is worth summarising some of the comments from the *Electronic Business Asia* report.

Personal computers. The worldwide PC market is expected to grow about 16% to 108 million units during the year, driving a lot of the growth in the industry. The technologies tipped to be the next big thing are Firewire (IEEE 1394) and Rambus.

Memory. A surge in demand for DRAMs will reverse the current glut and may even lead to a shortage later in the year. From a technology point of view, US DRAM manufacturer Micron Technology is expecting to be in production using 0.15 micron technology early this year.

Telecommunications. This is no longer the cash cow that it once was in Asia. The magazine says that the wire line market in China may be close to saturated and most other Asian countries are cutting back on their investments. However, mobile communications will continue to boom in the western world.

Consumer electronics. Although DVD has been tipped as the next big thing for a couple of years now with little result, the people in the know are still putting their weight behind it. In fact, the magazine is predicting that almost everything digital is set for a boom year — digital cameras, digital televisions, etc.

Pricing. The downward pressure on prices is worrying many people in the Asian electronics industry. Manufacturers find it hard to meet costs so wages fall and skilled people are leaving for better paid jobs elsewhere.

Management. In an industry driven by change, management is finding that long-term business plans don't work any more. Many are moving to a new model called trigger-point planning where a number of contingency plans are developed based on different things happening in the future. They then develop trigger points, based on market conditions, to work out when to head down a particular path.

The gist of the article is that the world economy will continue to slow a little but the high technology sector will do better than most with the second half of the year looking particularly good.

Another reason I'm feeling confident about the industry in Australia is the establishment of the Electronics Industry Association in South Australia (read the interview on p.50). My impression is that the industry was somewhat shocked by the actions of the Howard government after its election in 1996. But now the industry's regrouping and learning how to deal with these sorts of setbacks.

The EIA, rather than just being an exclusive club, is trying to include everyone with any sort of an interest in the industry from its customers to the government to the community at large.

The Australian electronics industry has always been thought of as a smart industry with highly skilled people working in it. Now it seems the industry is turning that smartness to its survival and future prosperity. And that can only be a good thing.

Christopher Connolly

AEDC goes under as manufacturing goes offshore

In February the Australian Development Corporation announced it had gone into liquidation. All its employees have been retrenched and the premises closed. The tide of electronics manufacturing heading offshore had collapsed the demand for AEDC's services. But several former staff remain somewhat upset about what has occurred. And there is some confusion as to how and why it happened.

It was reported that an attempt had been made to shut down the operation six months earlier, but the board rejected the move. They did, however, begin a scaling down in the third quarter of last year. This soon turned into a complete shutdown. On the 27th of November there was an auction of company property, and, as of the 15th of December, all operations had ceased.

Company secretary, Joseph Calleja of Ericsson, however, says that the company has not shut down or gone into liquidation. He acknowledges that staff have been paid out and property auctioned, but he says the company is still open for business. He also stated hopes for a possible sale of the legal entity.

The main reason behind the closure was a simple lack of financial viability. The Asian crisis took a heavy toll on business coming from that region as well as damaging the local market. The lack of government planning and policy for manufacturing, along with the effects of globalisation were also major factors. "About two thirds of local electronics manufacturing has closed or moved offshore in recent times," commented Chris Siddons, former executive director.

The company experienced a, "fifty percent drop in attendance to courses," according to Calleja. As Vianney Shiel, former principal lecturer and consultant at AEDC, said, "Training is very often at the bottom of the list and soon falls off the list altogether in hard times."

Former AEDC executive director Chris Siddons

Trevor Barr was the inaugural director and a consultant to the AEDC throughout its ten years. He felt that the cause of the downfall was the company's failure to reinvent itself in the face of these adversities.

However, there seemed to be a lot of disappointment with the lack of assistance to the company through hard times. The AEDC was not receiving any sponsorship as many believed. It was set up in 1989 by Ericsson and government and at that time received considerable funding. Several million dollars came from Federal and State Government, Ericsson, and a number of other major companies. This funding ended, as was planned, four years after it was set up and it continued as a self-supporting, not-for-profit, private company.

While they were a major player in the initiation of the AEDC and its support and promotion of the industry, Ericsson is also one of the many companies that has moved its manufacturing operations offshore. Calleja was quick to make clear that, the situation at AEDC was unrelated to Ericsson's move.

Regardless of current feelings Shiel, Barr, and Siddons all retained the sentiment that the AEDC had performed valuable work in its time. Well over 7000 people participated in courses it ran and, at one stage, it had an annual turnover of $1.9 million. Its success was, according to Barr, due largely to an, "exceptionally talented staff".

A number of former staff are turning to consulting, taking over areas in which they were involved at the AEDC. For information in regard to AEDC finances, business, property, or courses, contact details can be found at the AEDC web site *www.aedc.com.au*. Those courses outstanding will still go ahead with former AEDC staff contracted back to hold them. This will be overseen by Joseph Calleja.

By Ian Aird

Telstra appoints new CEO

The chairman of Telstra, David Hoare, has announced that the board has appointed former Optus CEO Dr Ziggy Switkowski as the new chief executive officer and managing director of Telstra. He has been with Telstra for eighteen months as group managing director, business and international.

Switkowski was obviously keen to take over a privatised Telstra, talking extensively about delivering value to its shareholders. "If Telstra is to continue to build shareholder value, we must deliver to customers what they need. We have to continue looking at how we can better meet customers' needs while ensuring a focus on growth and costs."

Hoare paid tribute to outgoing CEO Frank Blount, who is returning to the US. "He has steered Telstra through deregulation and taken it from a monopoly carrier to doing business in a highly competitive marketplace. Most importantly, he played a key role in guiding the company through the first stages of a stunningly successful privatisation process."

He said the challenge for Switkowski and Telstra would be "exploiting the opportunities offered by new markets, both here and overseas, and technologies, in particular, mobiles, data, internet and other value added services."

Switkowski has a PhD in nuclear physics and is also a graduate of Harvard Business School. He brings with him twenty years of senior business experience. Hoare said Switkowski takes over the position as of March 1 and he has been appointed for five years.

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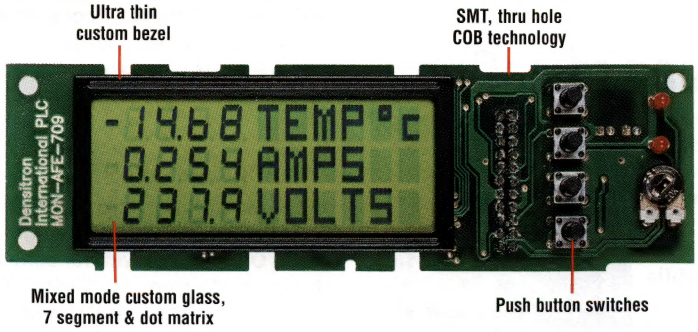

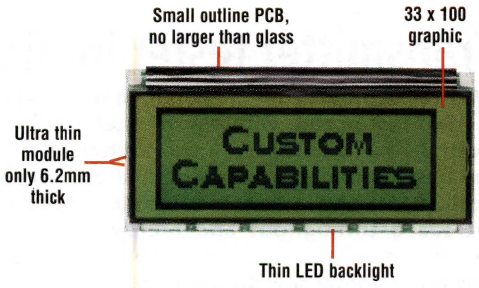

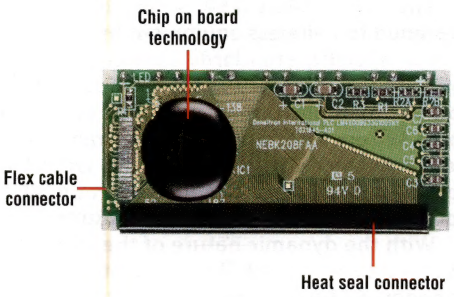

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Smarter smartcard systems

Australian owned IT company Keycorp, have been awarded $12 million in research and development assistance. The funding is to go towards developing a centralised management system for smartcards. The project is called Privacy Host. The assistance has come from the Commonwealth Government's industry research and development board.

The funding, to be provided over a 2 year period, consists of a $4.5 million Start Plus grant and an $8.1 million Start Premium loan which is repayable over 3 years starting in 2003.

John Wood, managing director of Keycorp, said, "Privacy Host is the unifying concept that brings together our work with the MULTOS smartcard, our advanced terminal architecture, and the internet payment gateway owned by our affiliate Nobil IT Corp."

The project is an extensive software and hardware development, including server and database systems and an enhanced terminal platform which allows Keycorp to expand the range of services offered at the point of sale. At the core of Privacy Host is the ability to dynamically manage and link application and content on smartcards, terminals and the internet.

It will act as an independent third party, providing a mechanism for service providers to share access to smartcards or terminals while maintaining the security of each application and ensuring the privacy of the card or terminal owner. With Privacy Host, any smartcard, terminal and internet interface can become a service point. Open interface specifications will enable it to connect to existing and future terminals from other vendors and to support the existing EFTPOS architecture.

Manufacturing live at Nepcon

The electronics exhibition Nepcon 99, being held in Melbourne in May, will feature a state of the art manufacturing process line, which simulates printed circuit board assembly in a working environment.

Referred to as the Interactive Nepcon Assembly Centre (INAC), the line will be divided into six cells with a service technician available at each work cell to explain the mechanics of the equipment and combat technical difficulties should they arise.

One company involved with the development of INAC is Machinery Forum who will be supplying all major pieces of capital equipment for the line. The equipment will include a screen printer, surface mountings, reflow oven, wave soldering, hand soldering, and testing and production monitoring equipment.

BEHIND THE COVER

Transmitter tester for GSM and cdmaOne

To help wireless equipment manufacturers keep up with the fast-paced wireless market, Hewlett-Packard Australia has announced a transmitter tester that offers the best combination of speed and accuracy for making both GSM and cdmaOne measurements. With the increased throughput and higher confidence in test results, manufacturers can increase profitability while providing tighter specifications to their customers.

The HP E4406A VSA series transmitter tester was designed for wireless equipment manufacturers who need format-specific, standards compliant test equipment to increase the efficiency of their production lines. Now they can test multiple formats with little or no change in equipment set-up. And, since no other transmitter tester offers better dynamic range for making critical GSM output RF spectrum (ORFS) and cdmaOne adjacent-channel power ratio (ACPR) measurements, engineers can have complete confidence in their test results.

With the dynamic nature of the wireless communications industry, equipment manufacturers need flexible test equipment that can easily adapt to future changes. As future formats are required, a simple firmware upgrade will incorporate new formats into the transmitter tester.

Further enquiries 1800 629 485 www.aee.com.au enquiry number: 2100

Electronic Resources to distribute Intel

Intel Australia has appointed Electronic Resources Australia to distribute its processors, motherboards, and networking productions, nationally.

Intel's general manager, David Bolt, said, "As Intel has continued to broaden its portfolio of products ... it has become obvious that we need to strengthen our distribution coverage."

Soanar to distribute Semitron & TDK

TDK's Ted Shibazaki (left) with Soanar's Bob Crabbe.

Soanar have been appointed as the distributor for Semitron and TDK in Australia and New Zealand. Semitron specialises in the manufacture of over voltage circuit protection components using in-house developed technologies and processes. They offer transient voltage protectors, breakover (thyristor) diodes, and non-radioactive gas discharged tubes. The TDK range includes inductors, EMC prevention, filters/LC modules, ferrite cores/magnets, ceramic capacitors, sensors, thermistors, ceramic resonators, transformers and microwave components.

Free logic design suite

Actel Corporation are offering a free integrated suite of design tools. DeskTOP is a three-vendor suite of logic design tools from Synplicity, VeriBest, and Actel, with technical support provided by Actel. The basic DeskTOP version will be offered free of charge to qualified designers through till January 31, 2000.

It integrates the functionality of VeriBest's DesignView Design Manager, schematic entry and VHDL simulator, Synplicity Synplify sythesis software, and Actel's Designer place and route tool as well as programming, logic analyzer and timing analysis software.

The second phase of the introduction will be in the second quarter of 1999 with the introduction of DeskTOP Pro and DeskTOP Open.

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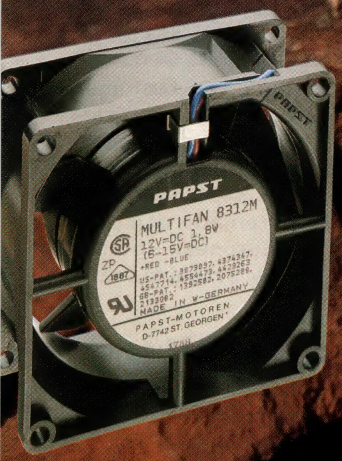

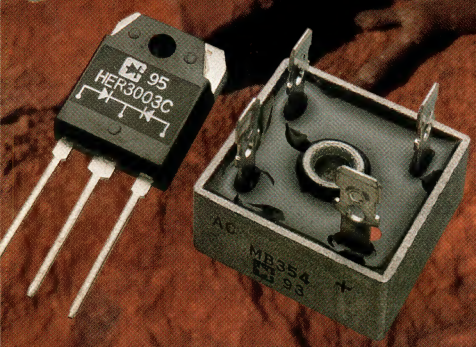

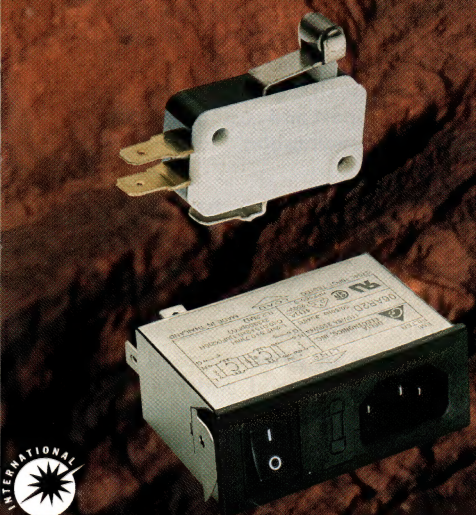

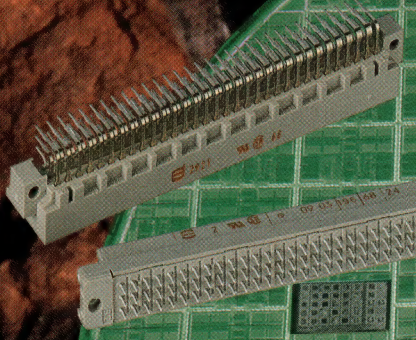

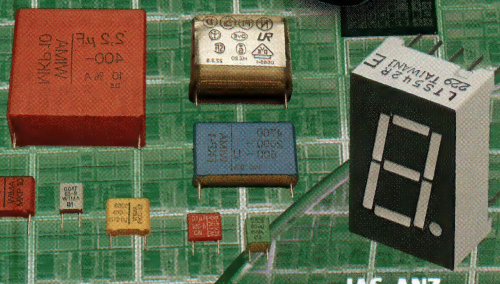

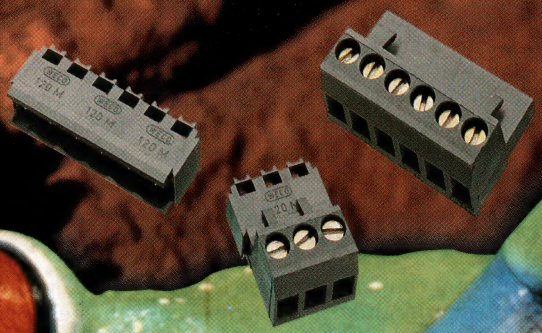

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Gosman leaves AEEMA

After eight years with the Australian Electrical and Electronics Manufacturing Association, Alex Gosman has resigned from his position as executive director to take up a position with Ericsson. During his years, AEEMA experienced much success, including the near doubling of membership in a vastly expanded range of interest areas, a raising of their public and Government profile, and a strengthening in their financial position.

Gosman paid tribute to the five AEEMA presidents he worked with, Robert Wilson, Brian McKay, Peter Janssen, John Almgren and David Peaston, and ATIA president Ron Spithill. "Their support and willingness to provide assistance has been inspirational and AEEMA has been lucky to have industry representatives of such capabilities in providing time and direction," he said.

"AEEMA faces future challenges as do all representative bodies with globalisation, greater demands on the secretariat and reduced member resources. However, it has shown the ability to reinvent itself to adapt to meet the changes in member requirements and the external environment."

Legislation to better protect Oz's designers

Significant changes proposed for the Australian industrial designs system will result in a more cost effective system that is responsive to users' needs and better protects designers' creations against copying.

Announcing the proposed changes today, the Parliamentary Secretary to the Minister for Industry, Science and Resources, Warren Entsch, said the Government would release the bill as an exposure draft before introducing it to Parliament.

"The existing designs system does not provide effective protection. Registration is too easy to obtain and infringement too difficult to prove," Mr Entsch said. "The Government will improve the new designs system by providing clearer definitions, stricter eligibility and infringement tests, a more streamlined registration system, and better enforcement and dispute resolution procedures. The exposure draft will give interested parties an opportunity to examine the bill and make suggestions to improve it."

Mr Entsch said the existing designs legislation had been in place since 1906. It had not kept up-to-date with either developments in design philosophies or the needs of design owners. Changes for designs system include:

introducing a new two-step threshold test — namely that a design is not registrable unless it is both new and distinctive;

expanding the prior art base so it will include use in Australia or publication anywhere in the world;

adopting a formal examination system to replace the expensive and time consuming substantive examination system. Voluntary substantive examination will, however, be made available to applicants and be mandatory prior to initiating any challenge to the validity of a design; and

reducing the maximum term of design registration from 16 to 10 years.

Now that the framework of the new designs system has been decided, officials will review the complex issue of how applications for design registration of spare parts will be treated within this system. The Government will incorporate the results of that review in the new legislation. Exposure drafts will be available after the review.

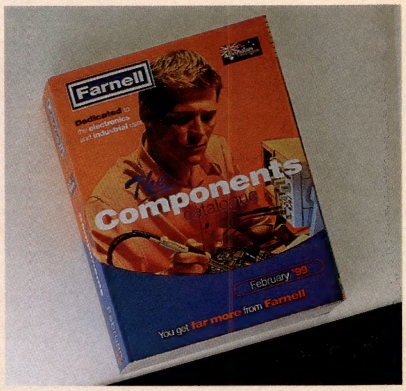
Stockmarket smiles on tech companies

Stocks in the high technology arena have done well of late. Link-ups between wireless communications operations and internet operations have done especially well. Motorola and Cisco Systems have announced they are jointly investing about US$1 billion over the next few years in a project to enable net access via mobile devices such as phones. Both companies experienced substantial gains in their stock values.

In the same vein Microsoft have been dealing with British Telecom and Nextel Communications have joined up with Netscape Communications, each to develop net services for mobile phone users. All four experienced gains in their stock value.

The computer industry has also done well. Dell, Compaq, Apple, and IBM all rose in value, as did the processor giants, Intel and AMD.

Farnell's Australian catalogue



Farnell has responded to customer requests and produced a product catalogue specific to the Australian market. In addition to the 400 new local products, it includes 3400 new products from leading international manufacturers. All the European specific products, not locally available, have been removed.

John Psalidas joins Elenex and Automate

John Psalidas has been appointed as exhibition manager for the Elenex and Automate exhibition. John has a background in engineering and sales, He takes over from Mac McKenzie who managed the shos for a number of years.

Veltek & Zatek now Arrow

The companies previously known as Veltek Australia, Zatek Australia, and Arrow CMS Distribution, all of which are Arrow companies, have ceased to operate as separate companies. They have all become operating divisions of Arrow Electronics Australia.

These changes allow Arrow to achieve greater efficiency and effectiveness without changes to service, engineering support and customer relationships or representation.

Arlec enter alliance with PDL

Avatar Industries has announced that its subsidiary, Arlec Australia, has entered into a series of agreements with PDL Industries. PDL will take over distribution of Arlec branded products in New Zealand and the South Pacific and Arlec will source and supply PDL with products, which it does not manufacture, for distribution under the PDL brand. PDL will also supply Arlec with a range of high quality electrical products and accessories, manufactured by PDL, for distribution under the Arlec brand.

Volume 14 Number 2 1999

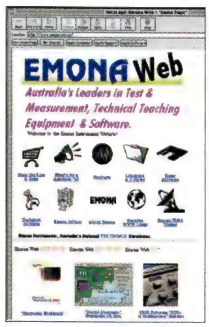
EMONA News

Electronic test equipment & software for industry and education.

Also in this issue:

Emona Instruments Pty Ltd

ACN 069 417 563



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RF Instrument

Lightest & Smallest 2.7GHz Spectrum Analyser

LG Precision's new SA-7270 high performance spectrum analyser offers outstanding performance at an unbeatable price. Small and light enough for field service applications, whilst providing the high accuracy and stability of a fully synthesised system, with a 1Hz resolution and wide 80dB dynamic range, the SA-7270 is an excellent instrument for demanding product development and testing applications. The SA-7270 is available with an inbuilt 2.7GHz tracking generator.

With a wideband frequency range of 9kHz to 2.7GHz, the SA-7270 has a very broad range of measurement applications, from mobile communications, broadcast signals, production compliance testing, through to EMC emissions testing, with the Quasi-Peak Detector option.

For ease of viewing of especially minute waveforms, the SA-7270 offers a large-scale, high resolution 187mm LCD screen. The front panel controls are particularly easy to use, with sensibly grouped single function "hard" keys and on-screen menu enabled "soft" keys providing additional functionality when required.

A variety of convenient and user-friendly functions such as Marker, Control and One-Touch functions accelerate the measuring processes.

SA-7270 Features

• Frequency
Tuning range 9kHz to 2.7GHz, with a 1Hz resolution. Span Widths include 100Hz/div to 270MHz/div, plus ZERO and FULL.

•Amplitude
Measurement range of +20 to -110dBm. Displayed range of 80dB in 10dB/div log scale to 8dB in 1dB/div log scale (4 ranges). Display scales include Log, Linear and Quasi-Peak enabled. Resolution bandwidths of 300Hz, 1kHz, 3kHz, 10kHz, 30kHz, 100kHz, 300kHz, 1MHz and 3MHz. (9kHz and 120kHz for Quasi-Peak option). Video bandwidth selection 10Hz to 1MHz in 1-3-10 steps plus None.

•Sweep
Sweep rate of 50ms to 1000sec in 1-2-5 sequence, 5ms to 20sec (zero span).

• Display
7.4" monochrome STN LCD, with 640H x 480V resolution. Marker Modes are Peak Search, Peak Track and Marker Track.

• Memory
Trace Storage of 20 traces including user defined traces and test limits. Set-up Storage of 10 operational states.

• Inputs & Outputs
RF - Type N female, 50ohm. IF Output 10.7MHz and video output. Ext Ref input.

• Frequency Standard
Stability 5ppm standard (0.2ppm option)

• Standard Interfaces
RS-232 (duplex); Printer (PCL3 drivers).

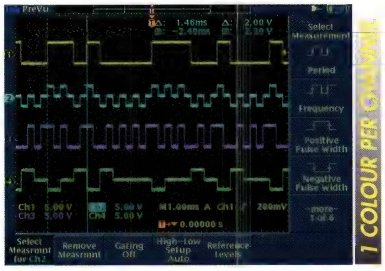
SA-7270 Options

• Built-in Tracking Generator, 100kHz to 2.7GHz •High Stability Oscillator, 10MHz 0.2ppm •Quasi-Peak Detector • DC/DC Power Supply, 90V to 250VAC & 10 to 20VDC • Battery Pack, 14.4VDC 7AH, rechargeable • Soft Carry Case • GP-IB Interface • PCMCIA Memory Card • Connector and Cable Assembly

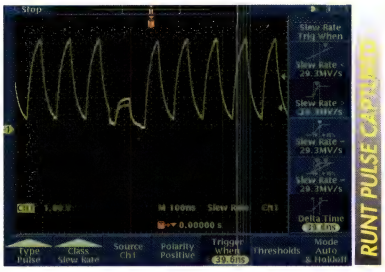
LG Precision

This is the Future in Oscilloscopes

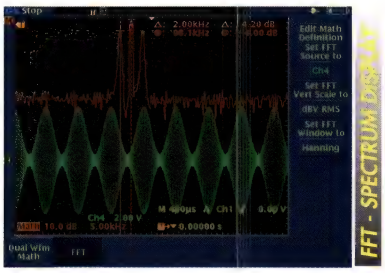
Better than analog and better than digital, the DPO scope is a blend of the qualitative and quantitative performance of both traditional types of scopes.



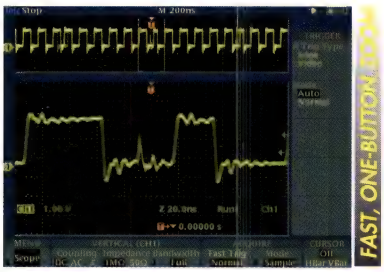
But the DPO goes further. While analog scopes can display the intensity information of a signal, they can not store or analyse them. The DPO delivers both the real-time response like its analog counterpart plus the ability to capture signals.



In addition to being protected from the digital aliasing to which digital scopes are susceptible, DPOs will much more easily capture infrequent signal events. Any and all complex signal behaviour, such as video signals or high speed anomalies on digital waveforms, are accurately displayed.



Now its possible to capture elusive signals that analog and digital scopes simply overlook. What's more, the DPO is able to deliver real-time performance, creating a live display of actual signal behaviour.



Digital Phosphor Technology Explained

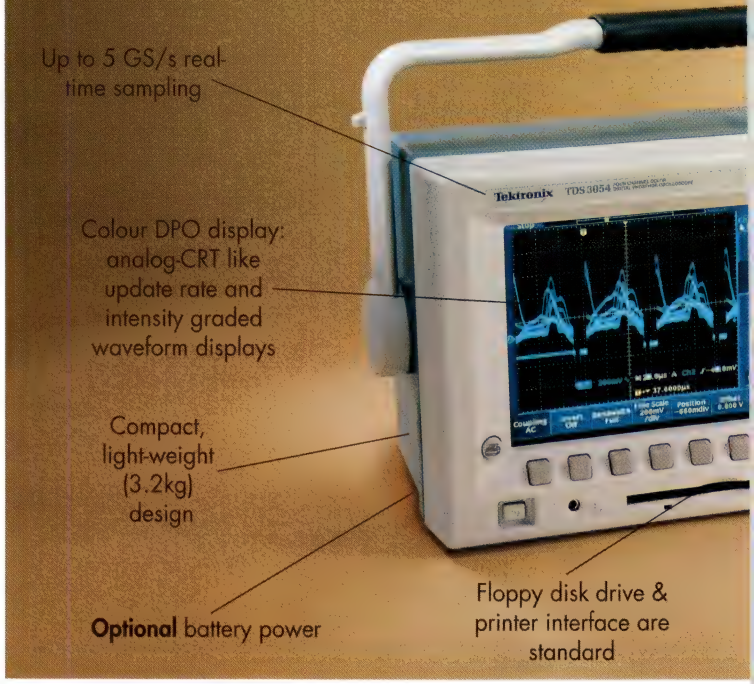
Digital Phosphor Oscilloscope (**DPO**) technology digitally emulates the chemical phosphorescence process that creates the real-time behaviour and intensity grading in an analog scope's CRT.

In a **DPO** scope, the incoming signal is **continuously** acquired and routed directly to the display. Instead of serial data processing, as in traditional digital scopes, the **DPO**'s post-processing µP operates **in parallel** with the Digital Phosphor circuits.

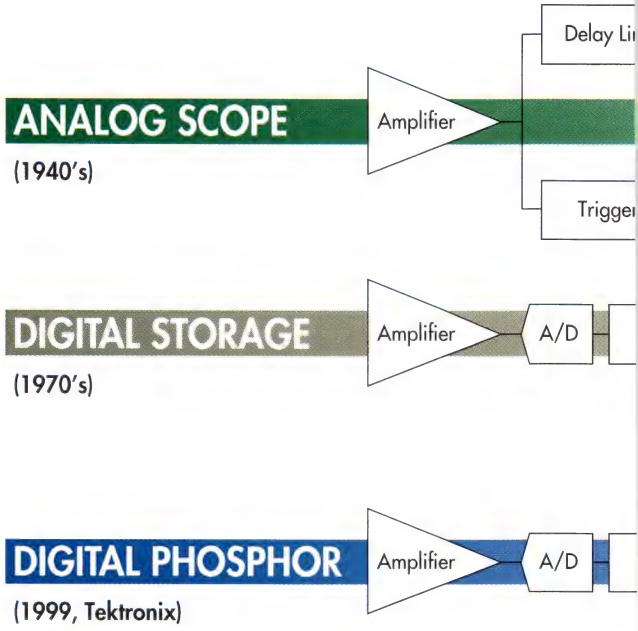
The **DPO** displays, stores and analyses signals in real time, using three dimensions of signal information: **amplitude**, **time** and **distribution of amplitude over time** (just as seen on analog scopes).

Better than Analog And

Tektronix TDS-



Tektronix DPO display technolo achieved through unique high s



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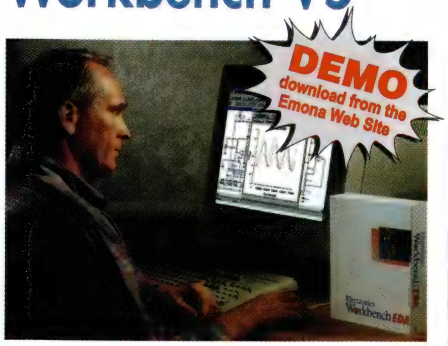
Circuit Simulator/CAD

Electronics Workbench V5



Now 4 versions available. Personal Version $674

Just click and drag to create and edit circuits. Mix analog and digital devices in any combination with full control over values, component models and behaviour. Try 'what if' scenarios and fine tune effortlessly. And on-screen waveforms always match actual circuit response. You'll create better designs faster - Guaranteed!

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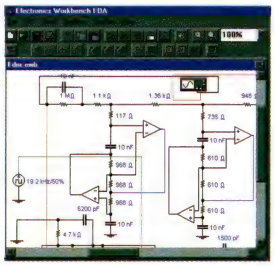
Join over 90,000 customers and experience the power, flexibility and value that only Electronics Workbench offers.

True Mixed-Mode Power
Connect any analog or digital device to any other device without limit. Integrated 32-bit SPICE analog and native digital simulation.



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Real-world TTL and CMOS, complete with propagation delays and fanout.

Top-of-the-line EWB-EDA Facilities
With the SPICE I/O EWB-EDA enables your designs be imported and exported to other SPICE-based simulators such as PSpice and MicroCap and the PCB Export will enable you to export the schematic files into PCB design packages such as Quickroute Pro+, Protel, OrCAD, Tango and others.

4 VERSIONS NOW AVAILABLE -

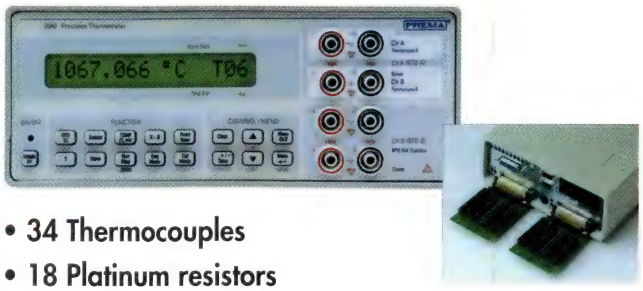
- EWB V5 **Student Version** only $137
- EWB V5 **Personal Version** only $674
- EWB V5 **Educational Version** only $674
- EWB **Professional Version** only $2,306

Interactive

Temperature Measurement

Multi Channel Precision Thermometer

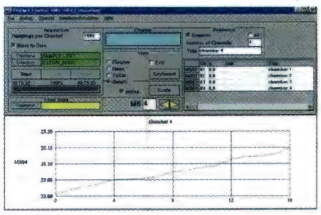
The Prema 3040 is the ideal instrument for precise measurement and comparison of temperatures. Up to 34 measuring points (Pt resistance thermometers and thermocouples) can be polled automatically with a maximum resolution of 0.001K, unbeatable in this price class.



- **34 Thermocouples**
- **18 Platinum resistors**
- **Stand-alone & PC operation, plus Data Acquisition**
- **Accuracy 0.002°C**
- **Display in C, F, K, mV, ohms**

Two platinum sensors or two thermocouples (and one platinum sensor for cold junction compensation) can be connected on the front. The other sensors are connected on the rear.

Applications for this instrument include quality control as well as research and development laboratories. This temperature measuring instrument is universally utilisable by virtue of its freely programmable linearization characteristics for each sensor.



The 3040 is equipped with both IEEE-488 and RS232 interfaces and can be operated via PC using Prema's Control software.

Prema

HV Supplies

1kV to 130kV DC Laboratory Supplies

The Spellman SL-series of compact 10W to 1200W high voltage power supplies provide a very well regulated, low ripple, variable output high voltage in a highly efficient, compact design.

SL-series Overview

- Variable outputs: from 0 to 1kV, to, 0 to 130kV, in 17 ranges • Protection: short circuit, overvoltage, overcurrent, arc
- Constant voltage/ constant current with auto crossover • Output inhibit control
- Extensive local and remote control capabilities • Low stored energy • Low EMI/RFI
- Output voltage & current adjustable from <1%, to 102% of rated output
- Regulation 0.005%
- Stability 100ppm/hour

Spellman

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- Power Supplies
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- Device Programmers
- PCB Faults Locators
- Electronic CAD Software
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- Cal Lab Equipment
- Power & Energy Analysers
- Video Pattern Generators
- T & M Cal Services
- Electrical Test
- Electrical & Electronics Teaching Equipment
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Better than Digital.
ore...
00 DPO scopes

QuickMenu for instant access to key functions

Optional application modules for FFT, Advanced Pulse/Logic Triggering and Extended Video Triggering

Auto-set

Waveform INTENSITY knob - controls waveform intensity like an analog scope

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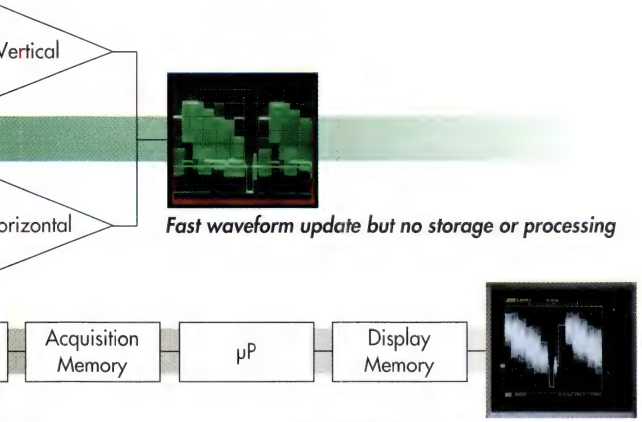
6 models
100, 300, 500 MHz
2 and 4 channels

Tektronix®

analog scope waveform display
l parallel processing technology



Fast waveform update but no storage or processing

The DSO's serial processing of acquired data causes a lag in response and losses in display of fast changing signals

Includes the fast waveform update of analog scopes plus the advanced capture functions of digital scopes & more

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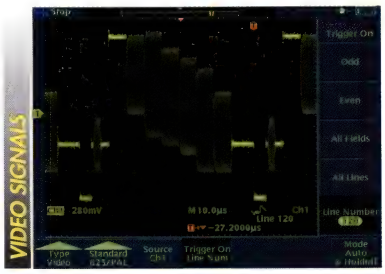
Exceptional Performance
The TDS-3000 family delivers bandwidth and acquisition capabilities usually associated with high performance R&D instruments.



Depending on the model, these scopes offer a full 100MHz, 300MHz or 500MHz single-shot bandwidth, simultaneously across 2 or 4 channels.

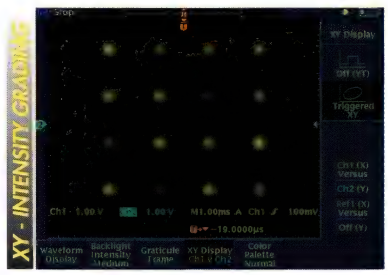
TDS-3000 Series Overview -

Model	Bandwidth	Channels	Sample Rate
TDS-3012	100MHz	2	1.25GS/s
TDS-3014	100MHz	4	1.25GS/s
TDS-3032	300MHz	2	2.5GS/s
TDS-3034	300MHz	4	2.5GS/s
TDS-3052	500MHZ	2	5GS/s
TDS-3054	500MHz	4	5GS/s

Prices start at only **$5,385**, excluding sales tax.

Easy Expansion & Customisation
To extend the TDS-3000's capabilities, users can easily install optional application modules. Up to four modules can be used simultaneously. Three modules are currently available:

- Fast Fourier Transform (FFT) for real-time spectrum display;
- Extended Video providing highly specialised video triggering, measurement and analysis functions;



- Advanced Logic & Pulse Triggering, including pattern, state, pulse width, runt pulse and slew rate triggering.

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FCI's recent acquisition of Berg Electronics makes us the second largest connector company in the world.

Second in size, maybe, but first in standard and custom connectors to meet the needs of today's most demanding applications.

If you are currently using another connector company, maybe you should give it a second thought.

FCI connects the world.

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a Framatome Group Company

Enquiry number: 2106

New electronics centre opened

The UTS Protel Training Centre

The University of Technology, Sydney (UTS) and EDA software developer Protel have combined to open a new electronics training centre. The intention is to ensure that engineering students at UTS have access to high quality electronic design tools.

It will be situated in the UTS building and Protel will supply the software and future upgrades free of charge. Overall management of the centre will be a joint responsibility. Protel will also use the centre periodically to run its Sydney training courses.

The centre was opened by the university's Professor Warren Yates and Protel's Steve Passmore. "This laboratory will provide real experiences for students and will have an ongoing benefit for both students and staff at the university," said Professor Yates. "At UTS we strive to produce graduates who can comfortably span the distance all the way from abstract theoretical conceptualisation to professional level competence with state of the art design tools."

Magic Jini goes over Java

Sun Microsystems are touting their new technology, Jini, as the network architecture of the future. Its ground work has been laid with their Java platform. Java, used a lot on the internet, has enabled users to run the same application from any kind of machine, whether it be PC, Mac, a network system, or even new technologies such as internet screen phones.

Now, over the top of Java, comes Jini technology. According to Sun, Jini has the potential to create the ubiquitous network. Each device in the network makes its 'capabilities' available to the network. Devices provide their own interfaces, no drivers or servers are needed.

Devices in the Jini network are tied together using Java Remote Method Invocation. This method, according to Sun, also provides security. The infrastructure in this system is small enough that a computer isn't needed to run as an intermediary between devices. For example, a mobile phone can work directly with a printer.

Development of Jini began in 1994. A number of manufacturers already have initiatives under way to enable their devices to enter a Jini network. Today's Jini network devices only require a power cord and a phone line socket. However, soon even the phone line won't be necessary. That means a device can enter a network simply by turning on.

At present Jini technology is in limited-release beta testing. Sun has established agreements with over thirty major technology companies to develop both hardware and software. These companies include Canon, Sony, Epson, Ericsson, Novell, Oki, Xerox, Mitsubishi, and Toshiba. Enabled products will probably begin to hit the market late this year.

A Jini development kit is available from Sun's web site for manufacturers interested in incorporating the technology with their products. It's free to manufacturers for research and development, although a license is required to put a Jini enabled device on the market.

Intel announces Pentium III

Intel has announced the Intel Pentium III brand name for its next generation microprocessor code-named Katmai. The Pentium III offers enhanced multimedia realism. It is scheduled for release at the end of the first quarter this year.

Intel has also disclosed that the new Pentium III Xeon processor brand name. The Xeon is targeted for the server and workstation market segments.

3M Electronics complete factory

3M Electronics Products Division has announced the completion of a major manufacturing plant, for 3M Microflex circuits, in Singapore. At approximately 580,000 ft^2, the facility is the largest 3M has ever built. Sale of circuits is expected to begin in April, first in Singapore and, by the end of the year, to other countries.

Solex's Australian Open

Solex Group is celebrating a successful first Australian Open. They recently won the contract to provide and install a temporary TV system which delivers 22 channels to over 300 TV sets for the Ford Australian Open tennis tournament. After the growth of the Tournament the Melbourne and Olympic Trust were forced to review the contract. Solex also had to establish a microwave link to the Hilton Hotel so players could keep up with the results.

Security innovations

Novell has teamed up with ActivCard in an attempt to solve security problems with internet servers. They have announced plans for the joint development of an authentication network security solution using Novell's network management and security together with ActivCard's smartcard technology. This solution attempts to ensure that companies managing private data and extending their networks to the internet can effectively firewall and restrict access to the private information.

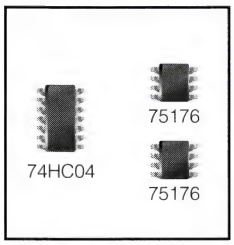
This new system will employ a single mechanism that will allow administrators to employ various levels and types of security, including static and dynamic passwords, digital certificates, and private keys.

WORLD'S SMALLEST SOFTWARE-SELECTABLE HALF/FULL-DUPLEX RS-485/RS-422

Reduces Board Space 7x—Only One IC!

In the past, systems requiring software-selectable half/full-duplex RS-485/RS-422 operation were implemented using two 8-pin half-duplex transceivers, plus an additional logic-inverter IC. The MAX1485 and MAX1486 provide complete software-selectable solutions in a single 10-pin µMAX package, which consumes half the space of a *single* 8-pin SO and reduces board space by 85% compared to the old solution.

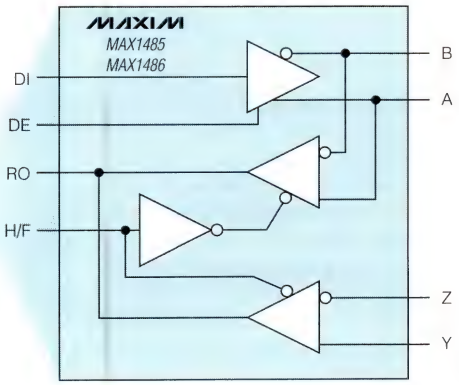
THE OLD WAY. . .



TOTAL AREA = 110mm²

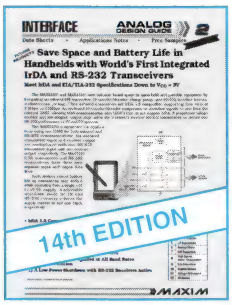
THE MAXIM WAY. . .

10-PIN µMAX
TOTAL AREA = 15mm²



Select the Ideal µMAX RS-485/RS-422 IC for Your Design

PART	HALF/FULL DUPLEX	DATA RATE (Mbps)	SLEW-RATE LIMITED	LOW-POWER SHUTDOWN	DRIVER ENABLE	RECEIVER ENABLE	NO. OF TRANSCEIVERS ON BUS	PIN-PACKAGE
MAX1481	Full	0.25	Yes	Yes	Yes	Yes	256	10-pin µMAX
MAX1484	Full	12	No	No	Yes	Yes	256	10-pin µMAX
MAX1485	Selectable	0.25	Yes	No	Yes	No	256	10-pin µMAX
MAX1486	Selectable	12	No	No	Yes	No	256	10-pin µMAX



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Real-Time Acquisition on the Internet

Tony O'Donnell explores virtual instrumentation and the Internet.

There is no question that the way we communicate, the way we share information and even the way we read the news or get the local weather report have been changed by the Internet and the World Wide Web. At the same time this vast global computer network is changing instrumentation applications and greatly expanding the capabilities of standard instrumentation and programming tools.

The instrument has been transformed from the stand-alone box in the rack to an interactive tool running on our computer, using the newest advances in instrumentation and computer technology. Moving to a component architecture both in hardware and software we are able to update, improve and customise individual components of our system without the need to replace the system as a whole. Seeing all the advances and applications of Internet technologies on different computer applications including information distribution and commerce, it comes naturally that we look at instrumentation and wonder how we can use this technology in our applications. The idea of using different software and hardware components for tasks like data acquisition, analysis and display lends itself well to extending it to more distributed systems running on LANs (Local Area Network), WANs (Wide Area Network) and the Internet itself. We are no longer bound to one computer running all the different tasks in one location. The idea of acquiring data in one location and using it in another is becoming more common everyday, but more importantly it is becoming much simpler to implement these solutions using the newest tools and technologies.

This article focuses on different types of applications performing acquisition and other instrumentation tasks in real-time in a distributed environment. Standard tools such as the web, web browsers, HTML (Hypertext Markup Language) and CGI (Common Gateway Interface) are used to build simple applications for performing remote acquisitions and sharing applications with other users on the web. The types of applications that can take advantage of a distributed architecture range from the very simple, such as displaying the temperature in the lab down the hall, to the very advanced, such as driving a robot on Mars.

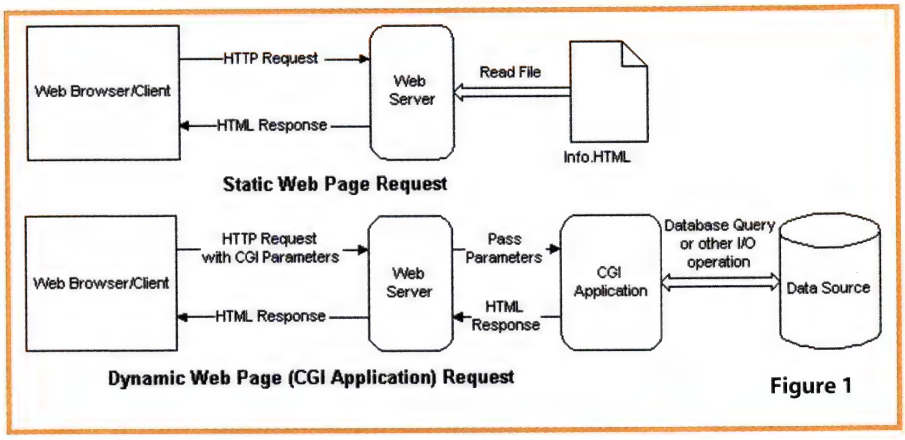

Figure 1

For building simple applications that perform remote measurements, little more than a basic understanding of HTML and CGI is needed, as well as the ability to write a CGI program in the language of your choice. HTML is a simple text based language for creating web pages. Using defined tags embedded in a page of text, we can format text, create tables, and embed images that are stored in separate files. These tags also allow us to define hyper links in a web page that will open up another page when clicked on in the web browser. When a web page is loaded into a web browser, the browser interprets the embedded tags and displays the information accordingly. It also loads any images referenced in the web page from their separate files. Hyper Text Transfer Protocol is the standard used by a web browser to make a request from a web server. This protocol is built on top of TCP/IP, which, because of its open nature, allows many different types of clients on different operating systems running on various hardware platforms to communicate with a single server.

Usually, a web designer writes the web pages, and the pages are saved as static HTML files on a server. These pages are then downloaded and displayed in a client web browser. Any change to the information on the web page is made manually by the web designer by editing the file stored on the server. However, we often need the information on a web page to be up-to-date, so that when the page is loaded, we always see the most recent data. A very basic way of handling this requirement is to run a program on the server that generates an HTML file at run-time. The Common Gateway Interface (CGI) provides this functionality. CGI is a method by which parameters can be passed between a web browser and a web server. The CGI program, script, or applications, as it is com-

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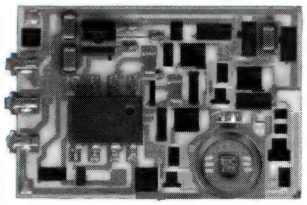

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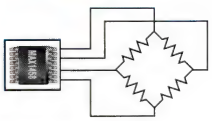

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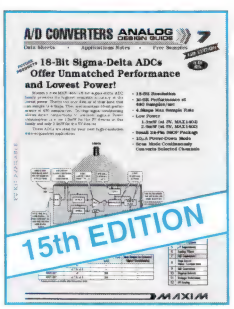

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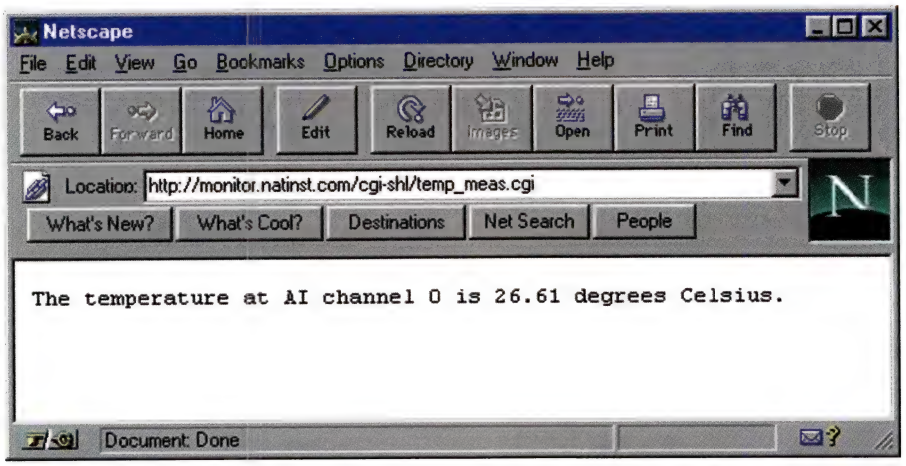

Figure 2 — LabVIEW Temperature Measurement CGI Program

monly referred to, can be written in a number of different languages including C/C++, Perl, and Visual Basic. When a web browser calls a CGI program, it is executed on the server. You can call a CGI application without using any parameters, but being able to accept parameters from the client, the CGI application can perform operations, such as database lookups, customised by the client. Besides performing these operations on the server, the CGI application also dynamically builds an HTML page that is returned to the client as a response to its request. The browser interprets this HTML response in the same way as static HTML returned by a server. A common example of such a CGI application is a web page and associated CGI application that allows the client to search for the stock price of a specific stock symbol. Once the symbol is sent to the server, the CGI application retrieves the price from a database and builds the page using this information.

In taking remote measurements or controlling outputs from a server, this same approach can be used. The commands to perform your instrumentation tasks are embedded in a CGI application and are activated from the browser by making a request to the specific application. Parameters for any measurements as well as output values can be sent along with the CGI request. In addition, the CGI application can convert and embed the measured values in the response HTML document or return confirmation of any updated outputs. Because CGI applications can be written in many different languages, you can usually continue using your existing development tools like the ones listed before and including graphical programming languages like LabVIEW for building CGI applications.

Important issues to consider when building distributed measurement and control systems include bandwidth, security, and reliability. These issues will be addressed in the following examples showing how to build some simple examples using different development tools.

A measurement made on the server when a particular web page is requested is the simplest type of distributed application. The measurement is made inside of the CGI application and returned embedded in the HTML that is generated by the CGI program. Following are two examples that perform this type of operation. The first example uses C for programming the CGI program, while the second repeats the same task using the LabVIEW environment and its graphical programming language. For this example we will make a simple temperature measurement using a plug-in data acquisition card in the computer.

Writing a CGI program in C requires three steps:

- Read the standard input stream and parse out input parameters
- Perform your server-based operations using the input parameters
- Format your output data in HTML and send it to the standard output stream

In the example below, a temperature will be read from a data acquisition board on the server and then the results sent to a web browser. Because we do not require any inputs from the client browser, step one can be skipped. In step two, we perform the measurement. In this example, we will read a voltage from a data acquisition board. In our program the function *AI_VRead()* makes a measurement from device, *iDevice*, at channel, *iChan*. This function applies gain, *iGain* to the measurement and stores the result in *dVoltage*. For step three, we format the data as an HTML data stream and send it to the standard output. In our program below, we have two possible outputs, an error condition in the case that *AI_VRead* returns an error (non-zero value), or the correct data when the status output is zero. For each case, we print a data stream to the standard output using *printf*. One aspect of the output stream is critical. The string, *"Content-type: text/html\n\n"* must precede any output data. This is called the HTTP header. It tells the browser what type of data to expect. It also must have two carriage returns, *"\n\n"*, to signal the end of the header. Any data that follows will be sent directly to the browser.

CGI Program Listing

```
#include <stdio.h>
#include "nidaq.h" /* data acquisition
driver */
void main()
{
        i16 iStatus = 0;
        i16 iDevice = 1;
        i16 iChan = 0;
        i16 iGain = 1;
        f64 dVoltage = 0.0;

        iStatus = AI_VRead(iDevice, iChan,
iGain, &dVoltage);
        if (iStatus == 0) {
                printf("Content-type:
text/html\n\n");
                printf("The temperature at
AI channel %d is %5.2lf degrees
Celsius.\n", iChan, dVoltage * 100);
        }
        else {
                printf("Content-type:
text/html\n\n");
                printf("Failed to measure
temperature. Status: %d\n",iStatus);
        }
}
```

There are a few steps involved in calling this program from a browser. First, we must compile the code into a standalone executable. The compiled executable we name *temp_meas.cgi*. The extension 'cgi' is just a convention to let us know that this application is a cgi program. Then this program must be placed into a directory on the web server from which anonymous users can execute programs. For security reasons, most web servers are configured to permit the remote execution of applications only within a certain directory. This directory is often named 'cgi-bin' or 'cgi-shl' as in the case of the server used for this example. To run the application we type the URL for the program within the URL field of the browser, such as 'http://monitor.natinst.com/cgi-shl/temp_meas.cgi'. 'monitor.natinst.com' identifies the particular server hosting the application, and the remaining information specifies the path to the CGI application.

The server responds with an output similar to the one below when this URL

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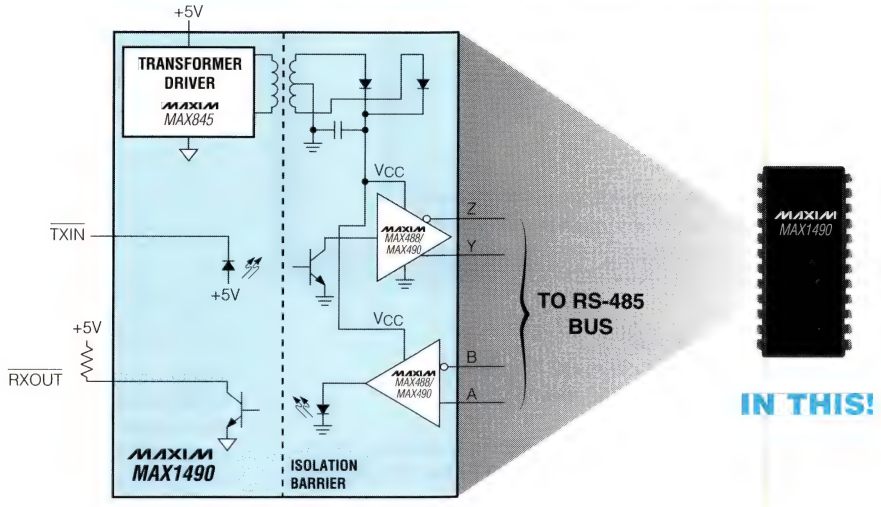

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MAX1480C	**4.75 to 5.25**	**Half**	**0.25**	**Yes**	**1.5**	**500**	**15.85**
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MAX1490B	4.75 to 5.25	Full	0.25	Yes	—	500	15.85
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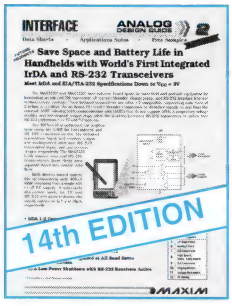
MAX3480B	3.15 to 3.45	Half	0.25	Yes	50	500	22.50

*1000-up



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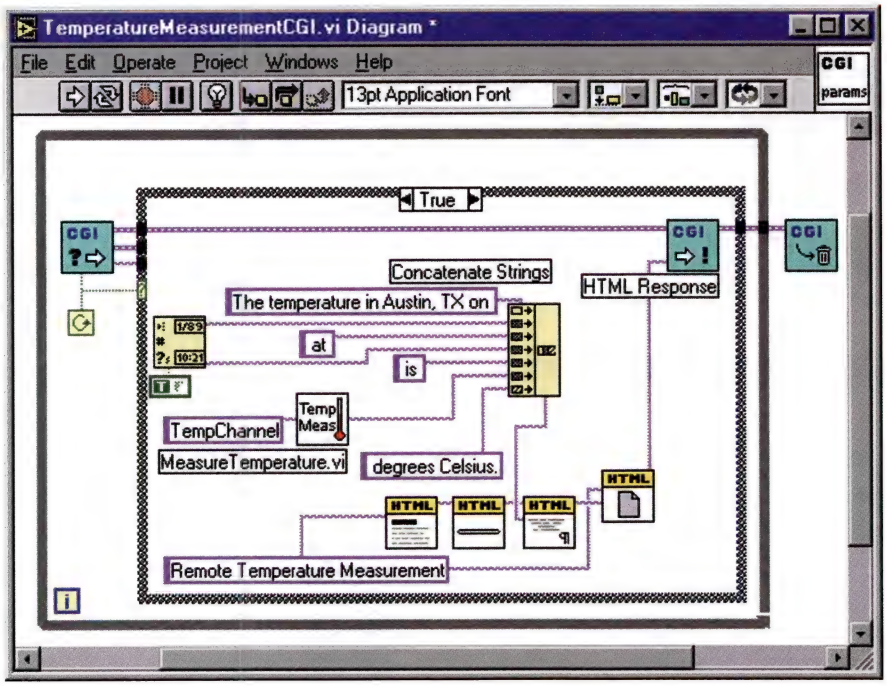

Figure 3

is called. LabVIEW is used as a programming tool in many different types of measurement applications. Combined with the Internet Toolkit for G, LabVIEW supplies both a web server as well as the capability to write CGI programs using its graphical programming language. Using a template CGI programming shell you can easily insert your own code to acquire a temperature measurement and create the HTML to return the measurement to the browser. The example program shown in Figure 3 acquires the temperature from a sensor using the 'Temp Meas' VI (virtual instrument subroutine) and combines the measurement with the current time and date in an HTML page. The HTML VIs along the bottom of the diagram automatically create the HTML tags while the three CGI VIs along the top handle the passing of parameters into the application and return the generated HTML to the client.

This is an example of an HTML code returned from the LabVIEW CGI program.

Sample HTML from LabVIEW CGI program

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2 Draft//EN">
<HTML>
<!— Constructed with the G Web Server —>
<HEAD>
<TITLE>Remote Temperature Measurement</TITLE
</HEAD>
<BODY >
<H2>Remote Temperature Measurement</H2>
<HR>
<P>The temperature in Austin, TX on 10/20/97 at 4:51:10 PM is 24.3 degrees Celsius.</P>
</BODY>
</HTML>
```

This example did not pass any parameters into the CGI application. However, we could have passed in a parameter such as a temperature scale selection that would have allowed the client to select either Celsius or Fahrenheit scale. This parameter would have been parsed out in the CGI application and been used in the scaling of the voltage measurement to temperature.

Using HTML forms is the most common method of passing parameters to CGI applications. HTML forms consist of simple input elements such as radio buttons, text boxes and list boxes that you can embed in your HTML page. The user enters the appropriate information and returns the parameter values to a CGI application specified in the web page. HTML forms are described and used in the last example of this article.

Remotely monitoring an application running on a different machine is another example of a common application. In many cases, an application, which performs a specific task, may already be developed and we need to monitor the status of such an ongoing application across an internal network or the Internet. Examples are slow data acquisition/data logger applications or simple process control systems. You can adapt an existing application to remote monitoring using several different methods, but at this point there are few standard tools available. Depending on what tools were originally used to build the application, you will use different methods to monitor this application remotely. In many cases you might choose to write a separate CGI application which can read critical values from your existing application and display them in an HTML page.

Often, however, this method is too time-consuming. Many times it may be satisfactory to simply display an image of the application's user interface in the web browser, which allows the client to see the current state of the application or process. Depending on the web server and application development environment used there are different options for retrieving such a user interface image. Different tools such as ActiveX controls and DLL function libraries are available to convert the user interface of an application into an image which can then be downloaded from a web server. Third party references like www.activex.com on the Internet will include listings of available tools. In this case you would use such a screen grabber tool inside of a CGI application to convert the user interface of an application into a downloadable image.

Other tools, such as the LabVIEW Internet toolkit, may include internal tools for this purpose. The LabVIEW Internet toolkit supplies CGI like functions that automatically convert the front panel of any running LabVIEW application to an image and download it to a web browser. These images can be viewed independently or be embedded in another web page. A typical request for an application front panel would be *monitor.natinst.com/.snap?TemperatureSystem.vi*. The snap command instructs the web server to retrieve the user interface of an application. The name of the specific application is specified after the *?* delimiter. The same reference can be embedded in an HTML page using the HTML image tag as in the following example.

Sample HTML code embedding an LV application image

```
<html>
<title>
Temperature Monitor
</title>
<body>
<h2>Internet Temperature Monitor</h2>
<hr>
<img
```

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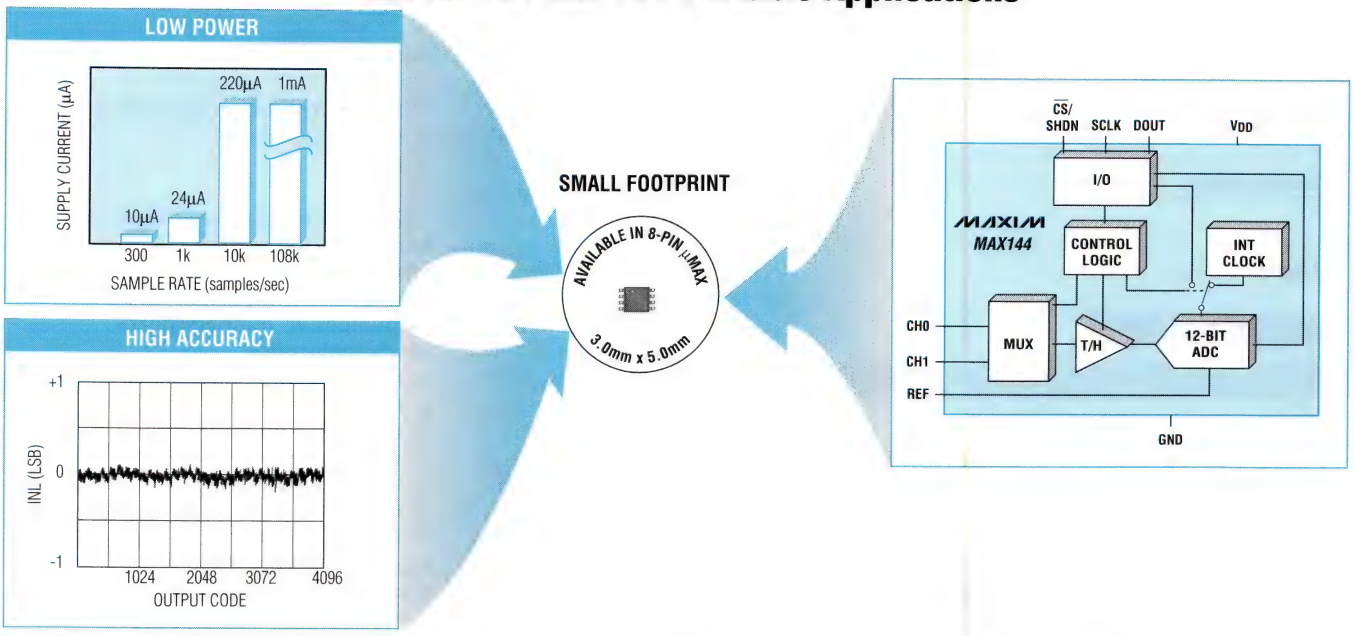

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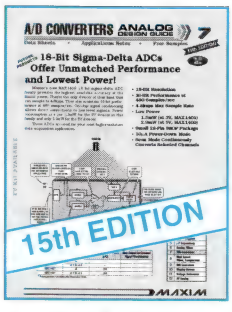

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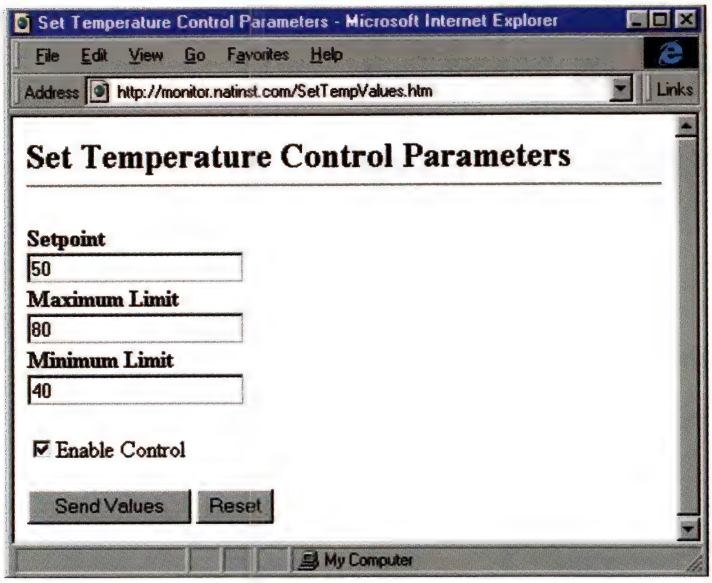

Figure 4

```
src="http://monitor.natinst.com/.snap?T
emperatureSystem.vi">
</body>
</html>
```

This example assumes that the Temperature System application is already built and running on the server.

Figure 3 shows the result of this HTML file in a web browser, assuming that the Temperature System application is already built and running on the server.

Once an application is monitored, the next logical step is to be able to effect some change on a remote application. This will typically take the form of setting a new value of a set point, starting or stopping a pre-defined process, or varying some other process variable. These types of changes tend to change the behaviour of a remote application but are not necessary to keep the application in a stable state. This type of control is referred to as supervisory control, meaning that the remote application is in direct control of its external process and the web client only acts as a supervisory control unit, varying pre-defined settings in the control application. This is very similar to a PLC (programmable logic controller) system connected to a computer acting as supervisory control and human machine interface (HMI). The reason for this type of system is improved reliability. A networked computer, especially when connected through the Internet, is not considered reliable enough to act as a direct controller in most applications. Therefore direct control is moved closer to the process with supervisory control performed from remote network nodes.

A typical example of supervisory control would be the changing of limit-values or a set point in a temperature control application. These parameters could be easily passed from a web browser into an application running on a server. The implementation of this type of system would depend on your preferred development tool. In general, you would write a CGI program which would accept the new parameter values, and in turn would pass them to another application running on the server which implements the actual control process. Because CGI programs usually only run when called by a web client you would not use the new parameters directly in the CGI program. The method for passing values from the CGI program to the main application will depend on your programming tools. Writing the actual CGI program to process these parameters is very similar to the previous examples.

HTML forms are commonly used to pass parameters and values into a CGI program. HTML forms are made up of HTML tags, which create simple controls such as text boxes, list boxes and radio buttons as part of a web page. The form tags also include the name of the CGI program to which the information is sent. The user can fill in the value or select from predefined options, and then submits them to a web server and corresponding CGI program. The following HTML code shows a simple form that can be used to pass three parameter values and a boolean to a temperature control application. Each control (text field) on the form is assigned a name and default value. The corresponding HTML form is shown in Figure 4.

Sample HTML form code

```
<html>
<head>
<title>Set Temperature Control
Parameters</title>
</head>
<body>
<h2>Set Temperature Control
Parameters<hr></h2>
<form
action="http://monitor.natinst.com/SetT
empValues.vi" method=post>
<b>Setpoint</b>
<br><input name="SETPOINT"
type=text value="50">
<br><b>Maximum Limit</b>
<br><input name="MAXLIMIT"
type=text value="80">
<br><b>Minimum Limit</b>
<br></b><input name="MINLIMIT"
type=text value="40">
<p></p><input name="Enable Control"
type="Checkbox"
value="EnableControl" checked>Enable
Control
<p></p><input type="SUBMIT"
value="Send Values"> <input
type="RESET" value="Reset">
</form>
</body>
</html>
```

This article discussed examples that used mostly passive clients. They display static information in a web browser or at best allow us to set parameter values and send them to an application running on a server. In some cases, we like to have more interactive remote interfaces to applications running on a server. These types of applications are common in many different types of environments including data base access and management, accounting, finance and more. They are normally built on a client/server architecture. We can apply the same ideas and concepts to test and measurement applications to develop more interactive control over our applications and processes.

A client/server architecture requires a bit of a different design in an application, especially with regard to the server component. We need to design the different components of an application with the final system in mind so that the different pieces fit together in a logical and efficient manner.

Tony O'Donnell is the managing director of National Instruments.

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Edward Tapanes describes how optic fibres have applications in the field of test & measurement.

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Background On Fibre Optic Technology

Communications using an optical fibre have a number of attractive features and advantages over conventional communication means. These advantages include: greater bandwidth and capacity; electrical isolation; low error rate; immunity to external influences; immunity to interference and crosstalk; signal security; ruggedness and flexibility; and potential low cost.

The high expectations of optical fibres as information carriers in communication systems have been justified by their performance over the past two decades. Due to their high bandwidth, low attenuation and mechanical properties, each fibre is capable of replacing over 1000 copper wires in telecommunication systems. With these characteristics it is no surprise that optical fibres have become the most affordable and efficient medium available in the field of telecommunications. Furthermore, the increased capacity, ease of system expendability, and reduced installation, operation and maintenance costs of the technology, is also making a strong impact industrial requirements and applications, replacing many of the traditional communication systems.

The monitoring of fibre cable integrity and the prediction of the onset of failure and damage is critical to the reliability of fibre communication systems. Most current techniques for monitoring fibre optic cable integrity are based on static or slowly varying measurements using an optical time domain reflectometer (OTDR) (ie sharp bends, fibre fracture, fibre attenuation, connector losses, etc.). However, it would be an added advantage to be able to obtain real-time, quasi-static and dynamic information about disturbances to the fibre cable. This would have the further advantage of monitoring any structure or material near the cable or to which the cable is attached. Such a capability enables simultaneous, real-time fibre optic communications and sensing applications such as structural integrity monitoring, leak detection, ground monitoring, machine condition monitoring and intrusion detection.

This is possible because optical fibres can be more than mere signal carriers. Light that is launched into and confined to the fibre core propagates along the length of the fibre unperturbed unless acted upon by an external influence. Figure 1 illustrates a cross-sectional view of an optical fibre.

Specialised sensing instrumentation may be configured such that any disturbance of the fibre which alters some of the characteristics of the guided light (ie amplitude, phase, wavelength, polarisation, modal distribution and time-of-flight) can be monitored, and related to the magnitude of the disturbing influence. Such modulation of the light makes possible the measurement of a wide range of events and conditions, including:

- strain/residual strain
- displacement
- damage
- cracking
- vibration/frequency
- deformation
- impact
- acoustic emission
- liquid levels
- pressure
- temperature
- load

Different configurations of fibre sensing devices have been developed for monitoring specific parameters, each differing by the principle of light modulation. Fibre optic sensors (FOSs) may be intrinsic or extrinsic, depending on whether the fibre is the sensing element or the information carrier, respectively. They are designated "point" sensors when the sensing gauge length is localised to discrete regions. If the sensor is capable of sensing a measurand field continuously

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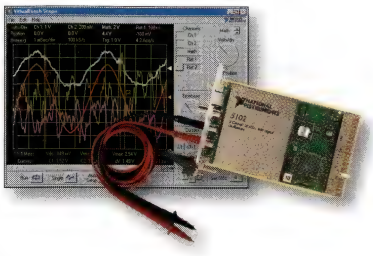

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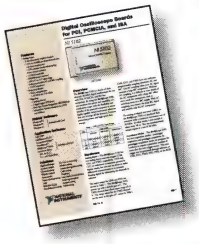

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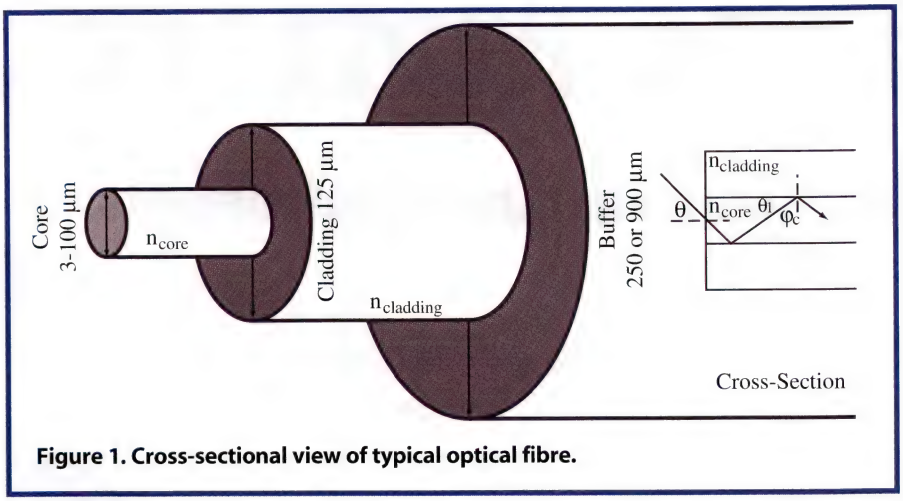

Figure 1. Cross-sectional view of typical optical fibre.

over its entire length, it is known as a "distributed" sensor; "quasi-distributed" sensors utilise point sensors at various locations along the fibre length. FOSs can be transmissive or can be used in a reflective configuration by mirroring the fibre end-face.

Therefore, FOSs are actually a class of sensing device. They are not limited to a single configuration and operation unlike many conventional sensors such as electrical strain gauges and piezo-electric transducers. Hence fibres are now replacing the role of conventional electrical devices in sensing applications to the extent where we are now seeing a multitude of sensing techniques and applications being explored for practical gain.

In a sensing application, the optical fibre should be installed such that the disturbing influence is coupled from the structure of interest to the fibre, thus altering some characteristic of the light within the fibre. Such modulation of the light makes possible the measurement of a wide range of events and conditions.

FOS technology can be utilised to monitor equipment and infrastructure because of its high resolution and it works in real-time, without electromagnetic interference problems. Furthermore, sensor lengths can vary between different devices; between point sensing configurations to very long sensing configurations (over 50km long). In addition, they are made from a very durable material that is corrosion resistant (pure silica). This cost effective and unique technology is currently utilised in the monitoring and evaluation of a variety of structures and machinery such as aircraft, motors, generators, bridges and pavements.

Summary

Communications using optical fibres have a number of attractive features and advantages over conventional communication means, and their performance has been proven over the past two decades. The value offered by these systems has now been augmented by the ability to simultaneously monitor, in real-time, the integrity of the cable, as well as any structure or material near the cable or to which the cable is attached. This attractive and useful new feature should increase the demand for the technology.

Fibre optic sensors offer a relatively new method for the measurement of many parameters. They possess several clear advantages over many existing conventional sensors and are slowly gaining attention in industry. The cost of fibre optic systems is rapidly decreasing and sensing techniques are being refined. As a result, fibre optic sensors will soon be accepted as a reliable and inexpensive measurement tool in many sensing applications.

The use of fibre optic sensing technology for the monitoring and diagnosis of the condition and performance of equipment and structures could provide a sound engineering and economic basis for the major decisions which will have to be made concerning the operation, maintenance, refurbishment or replacement and life extension of these items. The savings made by avoiding or delaying refurbishment or replacement could be substantial. Furthermore, their high resolution, insensitivity to electromagnetic interference, real-time monitoring capabilities and relatively low cost are characteristics expected to improve equipment and infrastructure safety and provide great potential benefit to industry and society as a whole. ●

Edward Tapanes is managing director of Future Fibre Technologies.

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Display Technologies

This month's product survey features the latest monitors, displays and LEDs. For more information on any item, call the company direct or visit the *AEE* web site *www.aee.com.au*

21in monitor range

Hitachi Australia has a range of 21' monitors available. The CM81X family features high resolution and refresh, high accuracy tube and gun, and advanced digital controls making them suitable for professional use for desktop publishing, imaging, CAD and engineering applications.

The CM813 is the top of the range with a resolution of 1856x1392 at a refresh rate of 71Hz. The standard VESA resolution of 1600x1200 is supported at 90Hz, while the CM811 model supports the same resolution at 75Hz.

Both of these models use a newly developed, high performance yoke and deflection system with A-EA-MDF, providing maximum brightness, contrast and quality while minimising picture distortion.

Users can store and recall numerous setting for screen geometry and colour parameters. Also incorporated is VESA DDC plug and play standards.

Further enquiries: 02 9888 4100
www.aee.com.au enquiry number: 1764

Flat panel display

Available from Hitachi is the PCX-DT3140 LCD monitor. It has a 14.1in display with an effective viewing area of 285.7mm(h) x 214.3mm(v). This is considerably larger than the previous model yet the cost is approximately 40% less.

The Super-TFT technology monitor has a viewing angle of 80° in all planes, a 1024 x 768 resolution, and displays over 16 million colours via Hitachi's Frame Rate Control technology. The screen has a typical brightness of 200cd/m^2. It is also Windows Plug and Play compatible.

Further enquiries: 02 9888 4100
www.aee.com.au enquiry number: 1756

Hybrid panel meters

Yokogawa has released the model 2302 electronic analogue/digital hybrid meter. It features a bar display consisting of 31 segments for the 0-100% range of full scale. For improved readability, the scale graduation is always lit. Natural bar graph movement makes trending quick and easy to observe.

The meter features a colour liquid crystal display that is back lit by a 12V, 0.3A halogen lamp for long life, uniform colour and brightness. Face displays are available in monochrome and green/red or yellow/red combinations. The 3 1/2 digit display consists of seven segment , 8mm LEDs. Accuracy is 0.25% of indication, plus one digit. Over range functions and polarity indications are included as standard.

Scaling features allow digital readings to be made in engineering units. Models are available as dc and ac voltmeters and ammeters. DC models are used together with an external shunt to monitor various input signals. AC models are RMS calibrated. Cases are constructed from polycarbonate resin in standard 96mm DIN size, depth being only 48mm.

Further enquiries: 02 9805 0699
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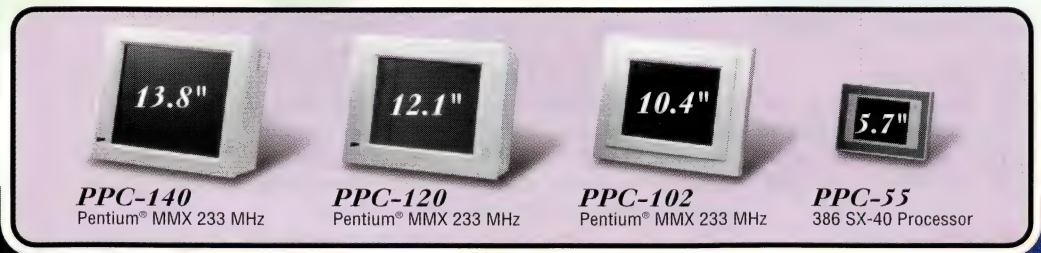

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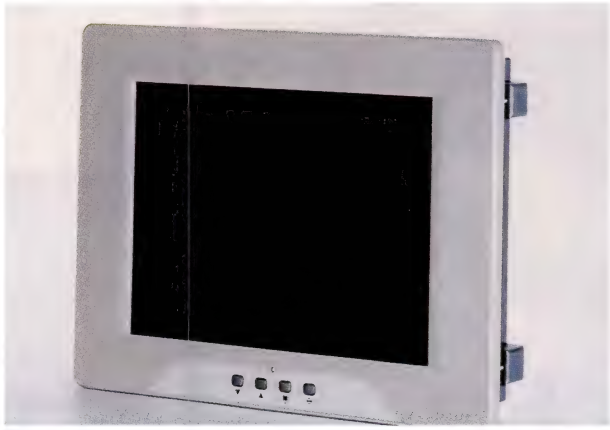
LCD panel monitor



Priority Electronics has released the TS12VH panel monitor. Designed for simple connection to a standard VGA analog RGB output, it has an 800x600 screen. It is suitable for applications requiring a robust, durable display module.

It is available with or without touch-screen and complies with the EMC framework for C-Tick approval in Australia. The lightweight panel display is suitable for industrial machines, automation systems, and lecterns.

Further enquiries: 03 9521 0266
www.aee.com.au enquiry number: 1755

OEM LCD kits

Priority Electronics has released a range of LCD display kits for the project design engineer and OEM manufacturer. The kits include accessories such as cables, LVDS extension, connectors, inverters, and adaptors. They are suitable as an industrial solution for single board computer applications. Displays are available in TFT, CSTN, and monochrome. Sizes include 5, 6.4, 7.4, 9.4 10.4, 12.1, 14, and 15in displays.

Further enquiries: 03 9521 0266
www.aee.com.au enquiry number: 1758

XGA active matrix LCD

Philips' HLD1506, 15.1in Active Matrix LCD, is available through Amtex. It offers 1024x768 resolution and an active screen area equivalent to a standard 17in CRT monitor. It has CCFL backlighting and an operational lifetime of around 50,000 hours. It has a typical luminance of 250cd/m^2, and is field replaceable.

It is capable of either 16.19 million colours or 256 grey-scales with a contrast ratio of 300:1. An LVDS interface option is available to allow the display to be driven over long distances.

Further enquiries: 02 9809 5022
www.aee.com.au enquiry number: 1759

21in USB monitor

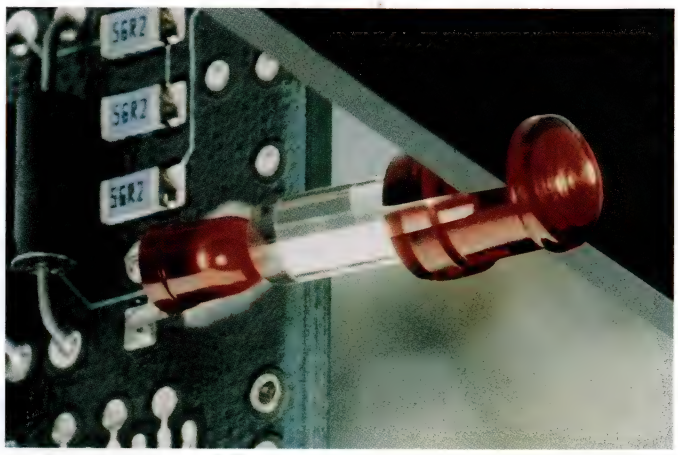
ViewSonic has announced, through Chips & Bits, the addition of the 21in (20in viewable) Xtreme P817 monitor to its Professional Series. It has a 360MHz video input bandwidth and a horizontal scan range of 30 to 137kHz. This enables a resolution of 2048 x 1536 at 85Hz refresh rate and 1920 x 1440 at 90Hz refresh.

To ensure sharp images and vivid colours at such high resolutions, it offers a 0.26mm dot pitch (0.22mm horizontal) and Invar shadow mask technology. It also has an anti-glare ARAG screen treatment which uses a multi-layer process to refract unwanted light while maintaining image quality.

It has a four-port USB hub. This allows four hot-pluggable devices such as scanners, printers and digitisers to run simultaneously. It comes with ViewSonic's OnView Host On Screen that allows users menu-driven adjustments, such as pincushion, trapezoid, contrast, parallelogram, degauss, moire and brightness.

Further enquiries: 03 9696 1911
www.aee.com.au enquiry number: 1761

Litepipe for LEDs

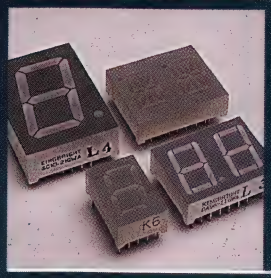


VCC's LCV/LSV series litepipes are available through C&K Components Plus. They are designed to provide a method of transmitting the light from a circuit board mounted LED to a display panel and, with the use of a lens, produce 180° of viewing angle.

These litepipes are designed for use with surface mount LEDs as well as standard 3mm and 5mm PCB, thru-hole vertically or horizontally mounted LEDs. They are moulded from an optical grade acrylic plastic for clarity and polished for optimum light transmission. Lengths range from 0.2 to 1.2in in 3mm and 0.36 to 1.36in in 5mm litepipes. The lenses are available in the colours red, green, amber, yellow, blue, and clear.

Further enquiries: 03 9587 4044
www.aee.com.au enquiry number: 1760

Dot Matrix LEDs



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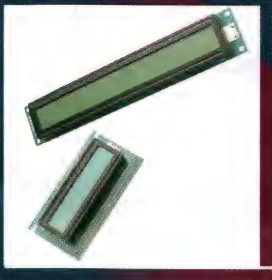

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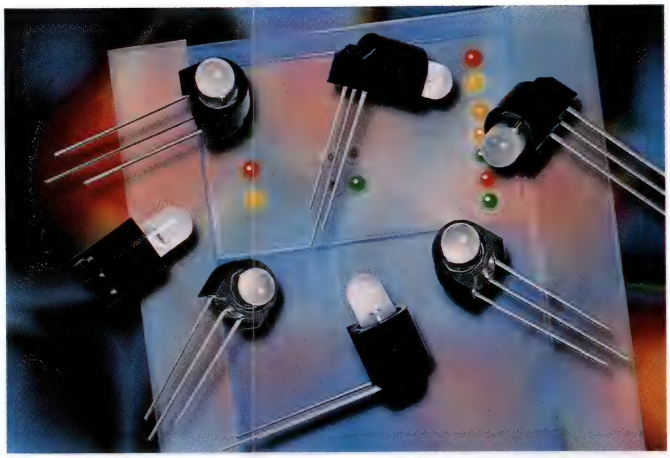

Available from M Rutty is the H178CBC 90° LED assembly from the Optoelectronics Division of Bivar. A standard footprint LED, it comes in a station housing utilising materials made of black nylon, per ASTM D-4066 PA111, UL rated 94V-0.

It is wave solderable and built-in housing standoffs facilitate board washing and removal of fluxes and residue. There is a choice of three circuit options — common anode, common cathode, and mixed circuitry. Staggered lead lengths offer easy coding and simplify installation.

Initially in white, three colour combinations are offered. These are red/green/amber, yellow/green/amber, and red/yellow/amber. Colour selection is derived by switching the polarity of the signal, offering the use of one indicator in place of three.

A daylight visible version is available including an ultra bright option >1000mcd, making it suitable for backlit applications.

Further enquiries: 02 9457 2222
www.aee.com.au enquiry number: 1762

Colour STN LCDs

Amtex has released two passive colour LCDs. One is a 320x240 STN colour LCD with CCFL backlighting. The viewing area is 115.2mm by 86.4mm. It is available with a choice of two matrix-type touch panels, one with 10x7 resolution, the other 16x12. This makes them suitable for hand-held terminals.

Also available is a 10.4in passive colour LCD module with high contrast, wide viewing area and low power consumption. It is suitable for industrial equipment, POS equipment, etc. It can display at least 16 gray scales and more than 256 distinguishable colours, depending on the controller used. Amtex can provide a total integrated solution from its range of single board computers if the display needs to be interfaced to a computer.

Further enquiries: 02 9809 5022
www.aee.com.au enquiry number: 1763

THE SMART TRAFFIC LIGHT

A trial is currently under way in Melbourne of an LED based traffic light which can save 80% of the power costs compared to conventional incandescent traffic lights. The 'light' consists of an array of 150 LEDs on a printed circuit board with various 'smart' features to reduce operating costs and the lights' downtime.

The brightness of the lights is automatically adjusted relative to the ambient light so it can be seen clearly during bright sunlight and it doesn't appear glary at night. The LEDs are also clear coloured when they're switched off so rays of sunlight can't reflect off them and give the mistaken impression that the light is on. The light also monitors its own status and sends signals back to a control centre if it has a minor or major malfunction.

The idea came from commercial and industrial lighting manufacturer Moonlighting which approached the Photonics Redcentre for assistance in the development. The Redcentre drew in the Australian Photonics CRC to use its Product Development Facility in Melbourne and Ellipcys for additional electronic design services.

The cost savings from the light are estimated at more than $7.4 million a year in Victoria alone. Discussions are currently taking place with Vic Roads and other road traffic authorities and the company is hoping the product will lead to export opportunities. ●

By Pamela Thompson, Marketing Manager, Photonics Redcentre.

The LED-based traffic light being trialed in downtown Melbourne.

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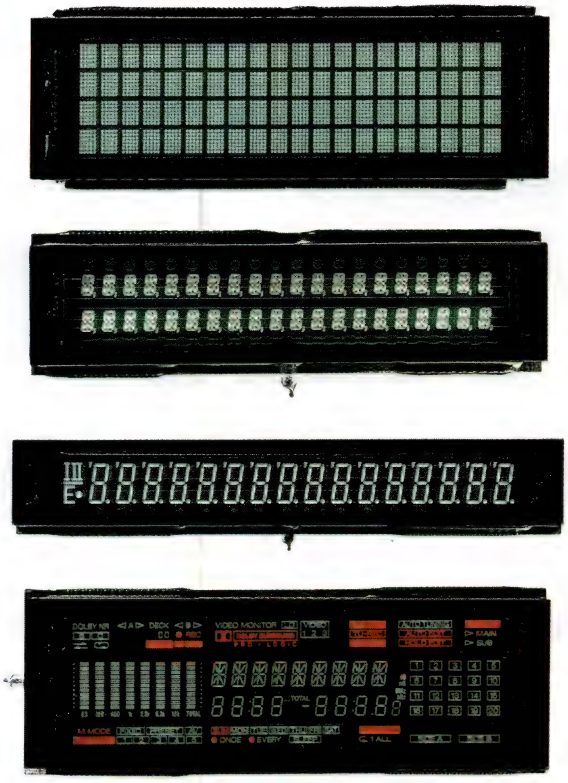
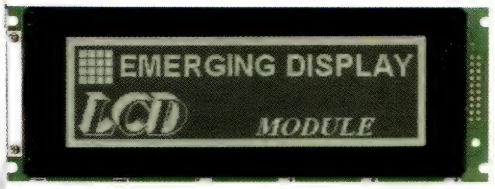
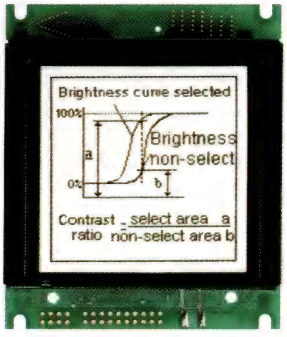
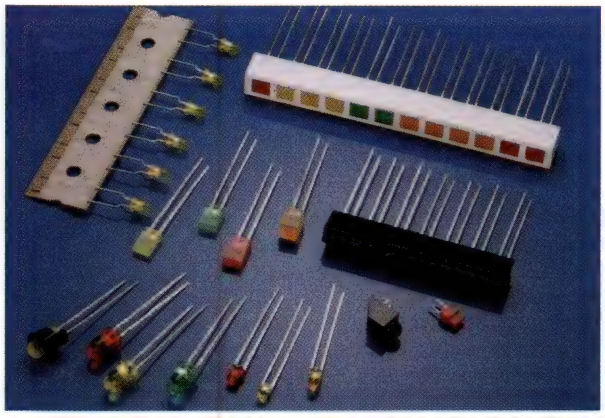
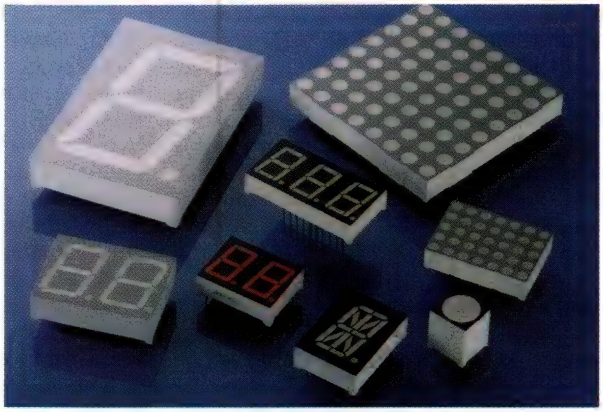


Noritake Vacuum Fluorescent Displays









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Where to for electronics in Australia?

After a rough couple of years, the electronics industry is finding its feet again. But there's a general feeling that the industry and governments have to start working together more if the industry is going to thrive into the future.

What a schizophrenic industry this is! AEE recently surveyed a number of people in the electronics industry as to the healthiness of the industry. Virtually no one thought the industry as a whole was healthy. Yet most said their own company was doing quite well. Why is this so?

A hint could come from the response of Kerry Kelly, managing director of component distributor Memec EBV: "I believe the electronics industry is in a state of recuperation after the past 24 months, which I believe was the worst period in the past 15 years." Maybe things are picking up and people haven't yet realised the recovery is happening industry wide.

However, other comments point to a different problem. When asked about the future health of the industry, most respondents thought it relied on the industry and the government working together in some way or other. Utilux managing director Peter Janssen pointed to countries such as Taiwan, Ireland and Israel as countries similar in size to Australia that sport very healthy electronics industries thanks largely to a pro-active government.

Is this relevant to Australia? Many people in the survey felt that Australia's strengths lie in its highly skilled electronics engineers, but its weakness lies in a government that is barely aware the industry exists and has no intention of offering incentives to people wishing to invest in the industry.

What are the problems?

When asked why the industry wasn't in a healthy state, a number of reasons were cited. The one that came up most often was that manufacturing is not considered a priority for the government or the population at large. Australian AMP general manager Robert Jarvis said there is "a general public opinion that digging holes in the ground (mining) and primary industry is the total solution to our manufacturing in Australia".

Kerry Kelly ... "Australian financial markets do not view technology as they do overseas."

A related reason involved the lack of investment or re-investment from financial markets. Soanar managing director Bob Crabbe suggested the introduction of a stronger venture capital industry. He cited the federal government's Management and Investment Companies (MIC) Scheme as an example of a government scheme that encouraged investment in the electronics industry. It ran from 1984 to 1991 and licensed 14 investment companies which raised a total of $374 million which was invested in over 150 businesses.

Kerry Kelly also thought there was a problem with re-investment. "Australian financial markets do not view technology as they do overseas. They are always looking for short term results."

Other problems raised included the effect of the Asian financial crisis, a change in focus from Telstra, globalisation of the industry, and cutbacks in assistance for research and development.

Outgoing AEEMA executive director Alex Gosman said he thinks the industry doesn't invest enough in its own well being and looks to government too much. Australian Electronic Manufacturing Services managing director Hugh Kelly was inclined to agree, saying that the "growth of the industry has meant that many companies are unable to satisfy all their demands for capital, skilled labour and other infrastructure". He thought the labour shortage was likely to be the major problem. "Consequently, there is an urgent need for industry to develop strategies to grow and source the right people including the development of partnerships with both private and government training/educational organisations."

Peter Roan of Tektronix agreed. "We have more expertise in Australia than we can consume so many people look to outside for employment. This is not healthy. Industry is not helping to employ good people and must soon start to step up to its responsibilities such as training young people."

A changing world

Both Alex Gosman and Hugh Kelly say the industry is in a state of transition with a fair degree of confusion and

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uncertainty. Kelly said the industry "must develop new sophisticated business models to meet increasingly demanding customer expectations particularly in relation to price, shorter delivery times, and improved standards of service. This has meant that OEMs now have to reshape the traditional boundaries and environments in which they operate."

Gosman said the Australian industry can't divorce itself from what's happening internationally. "We are seeing a lot of consolidation, going from many manufacturers in the industry to just a few with increasing outsourcing." He pointed to Ericsson pulling its manufacturing out of Australia and Alcatel handing its manufacturing over to Bluegum as examples of the changing attitude in the industry.

What role should the government play?

Alex Gosman said: "The government has got to be congratulated on the economic position of the country. But a lot of the decisions it took affecting the electronics industry showed a distinct short-term focus, the results of which are now being seen with the reduction in R&D spending."

Not surprisingly, the general feeling of the respondents was that the government is not doing enough to support the industry. "A level playing field is not enough," says Peter Janssen. He said Australia just doesn't come into the calculations of most multinationals and the industry and government have to get out there and give them reasons to consider us.

Alfa-Tek's Will Fiala said: "If you examine other countries that have done well with market domination you will find either access to large markets or massive initial government help showing up as major factors. Neither of these apply to Australia. My gut feel is that money without a strategy is probably a waste of time but that incentives combined with a long term strategy is a good bet."

He suggests a sort of "Snowy Mountains Scheme for technology" as a solution. "Identify a market where we are good at, give some tax reasons to bring some of out top performers home from where they have fled to. And go for it with all guns blazing."

Erni's Quinton Prince suggested that companies such as Telstra and Optus should be required to purchase a certain amount of Australian content. In the past, Telstra did give preference to Australian suppliers but now "everything is calculated purely on a financial basis," said Prince.

Hugh Kelly ... "A reduction in payroll tax would significantly benefit the industry."

Western Australian deputy premier Hendy Cowan defends the governments. As minister for Commerce and Trade, his department recently conducted its own survey of WA's Information and Communications Technologies industry and found it to be in a very healthy state.

He cited a number of examples of assistance governments provide to the industry, including the development of the Western Australian Technology Park, the establishment of an Office of Information and Communications within his department, and the Centres of Excellence program which "is providing common user research infrastructure to support industry and academic research cooperation in these areas as well as in other industry sectors."

He said the industry's strengths "include highly skilled and innovative people and specialist expertise in areas related to our major industries" adding that his government will work with industry to increase opportunities for growth.

Tax issues

Capital gains tax, fringe benefits tax and payroll tax were all nominated as taxes that hinder the industry and, therefore, ones the industry would most like to get rid of. Many, though not all, thought the introduction of a GST would be a good move, if only to get rid of some of the other taxes. Ericsson managing director Kjell Sorme summed it up, saying, "The tax regime needs to be substantially simplified, and encourage more investment in R&D."

Hugh Kelly said that payroll tax is "the most inequitable and crippling government tax incurred. This industry is labour intensive and therefore pays a disproportionate level of tax. The tax is further regressive because of the short-term time demands for payment. This unnecessarily penalises companies with large workforces. Local manufacturers are discriminated against in that they do not receive the same time concessions for payment of taxes enjoyed by, for example, importers. A reduction in payroll tax would significantly benefit the industry and the loss of revenue could be offset by increasing import duty on incoming goods."

Let a thousand flowers bloom

Peter Janssen used Taiwan as his example of where the government and industry work together successfully. "There is no inherent reason why you should manufacture in Taiwan," he said, but a pro-active government has drawn the investment into the country. "It's not a question of charity or handouts. It's doing smart business in the modern world."

Alex Gosman said he is a strong advocate for what they do in Israel. "They have an active engagement between industry and government and a general philosophy of 'Let a thousand flowers bloom'."

Israel's success hasn't come overnight. IBM established a presence there not long after the country came into existence in 1948. Intel established a chip design centre there in 1974 because of a shortage of electronics engineers in the US and a surfeit in Israel. Given a package of investment incentives from the government, Intel then established a plant for its next generation of microprocessors in 1985.

Other companies, including Motorola, National Semiconductor and Vishay, have also set up manufacturing operations. These in turn have helped local manufacturers such as Tadiran and Elbit take their products to the world.

Of course, the assistance measures of places like Israel, Taiwan and Ireland can't be put in place overnight. It would require a long-term plan, looking past the next election and the ones after that. The respondents to our survey were all of a mind that Australia has the skills and potential in its electronics industry to become a powerhouse. What it seems to need now is a more concerted effort to sell the potential worth of the industry to the government, the Australian people and the world.

If you want more of a say on the future of the industry, AEEMA is currently conducting an electronics manufacturing study, part of which will be done through its website (*www.aeema.asn.au*). ●

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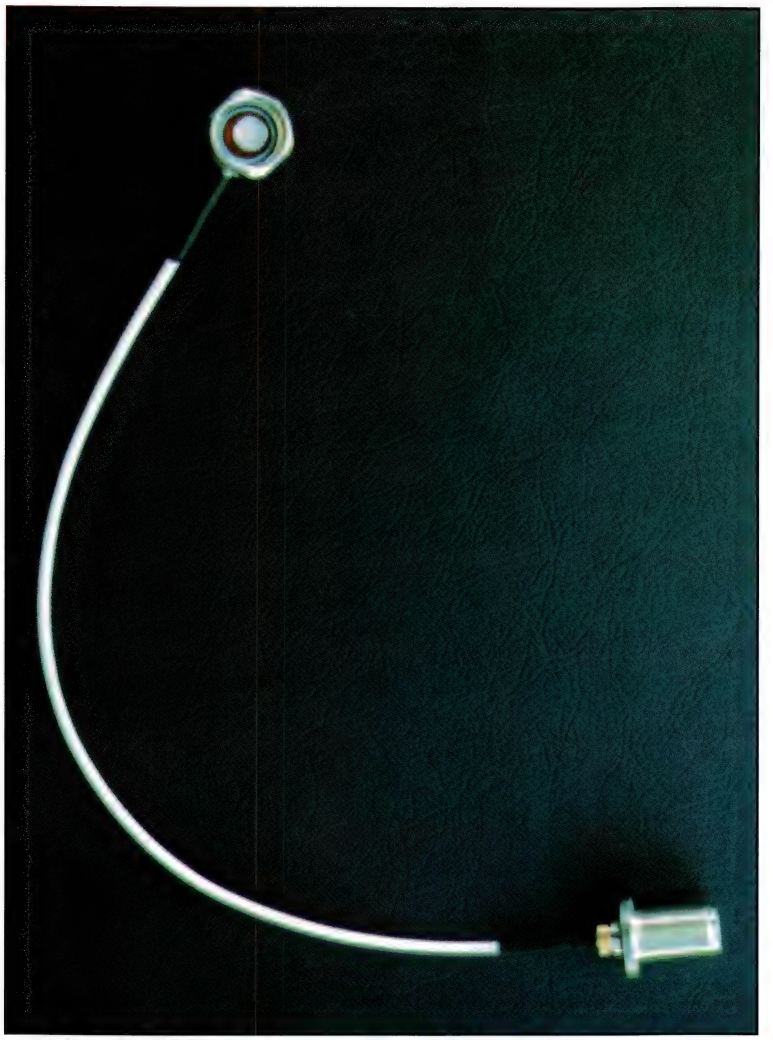

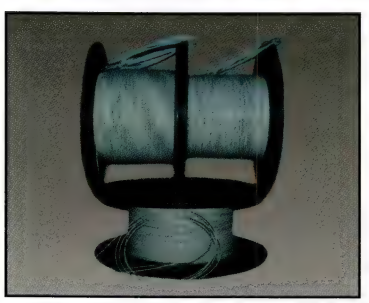

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www.gore.com

Enquiry number: 2121

DC-AC inverters

A range of compact and efficient dc-ac inverters is now available from Amtex Electronics. The DA series is designed for mobile equipment like faxes, PCs, printers, etc.

Operating from a 12V or 24V dc source they provide a 240V ac, 50Hz output in a power range of 100, 150, 200, 300, and 600W. They meet the latest EMC standards and come with a number of protection features.

Further enquiries
Tel: 02 9809 5022
www.aee.com.au
Enquiry number: 1766

UHF FM/FSK Receiver

Arrow Veltek has released the CMX018 from Consumer Microcircuits Limited (CML). It is a single chip UHF FM/FSK double-conversion super-heterodyne receiver. It combines a dual gain mode Low Noise Amplifier (LNA), two down-converters (including integrated oscillators), limiting amplifier, RSSI, FM/FSK demodulator and zero-power mode control.

It operates in 865MHz to 965MHz Band (European and US ISM Band) and voltage operation can be as low as 2.7V. It comes in a compact 28-pin SSOP package. It can be used in conjunction with the CMX017, an integrated FM/FSK modulator and transmitter, to implement a complete UHF radio link.

Further enquiries
Tel: (03) 9574 9300
www.aee.com.au
Enquiry number: 1784

Process Calibrator

Now available from MB&KJ Davidson is the TRX-II Multi-function Documenting Process Calibrator. It can measure, source, and simulate a wide range of thermocouples, RTDs and temperature transmitters. It can also source and measure voltage, current, ohms, frequency, and pressure. Other functions include datalog, ramp, step, scale, switch, pulse and counter/totaliser.

Thermocouple compensation wires can be connected direct to the unit, and cold junction compensation is provided at the point of contact. It has a RS232 port for uploading and downloading data. A PCMCIA card station permits up to 400 calibrations to be stored for each 1Mb card. This enables data transfer by card rather than transporting the instrument.

Further enquiries
Tel: 03 9555 7277
www.aee.com.au
Enquiry number: 1769

Laser gauging sensors

Micromax has released Banner Engineering's L-GAGE Laser Gauging Sensors. They have a maximum resolution of 10 microns and use both analogue and discrete outputs. They are suitable for applications such as calibrating robot arms, wafer profiling, measuring diameter or thickness, and assembly dimension inspection.

The L-GAGE eliminates the need for a separate controller and thus the self contained, one piece design decreases set-up time and conserves production area space. It uses TEACH mode programming which allows users to set custom-sized sensing windows and place them anywhere within the 45 to 60mm range, using a single pushbutton. This programming can also be performed remotely.

Further enquiries
Tel: 1300 362636
www.aee.com.au
Enquiry number: 1765

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Tel: 0800 888 780 Fax: 0800 888 700 (New Zealand)

Technical Helplines

Tel: 02 9681 8500
Fax: 02 9681 8600

Quality Endorsed Company ISO 9002 Lic. 2126 Standards Australia

Enquiry number: 2123

Shaker control system

MB&KJ Davidson has released Dactron's Dual DSP Shaker Control System. It enables random, sine, shock and advanced vibration simulation. Its 20-bit inputs and outputs deliver accurate performance.

It has a control dynamic range of greater than 90dB which protects test articles by providing safe control of large accelerations to tight tolerances. A distributed processing architecture handles the control loop independent of the PC processor producing a very fast control loop.

Further enquiries
Tel: 03 9555 7277
www.aee.com.au
Enquiry number: 1768

5-line digital isolator

Analog Devices has introduced the AD260 high speed digital isolator. Designed to withstand common mode voltages of 3500Vrms, it isolates five HCMOS/ACMOS-compatible, 5V digital logic signals and provides a power transformer in the same package to isolate power. The 1W uncommitted power transformer allows designers to incorporate an on-board isolated "field I/O" dc-dc power supply circuit.

Incorporating ADI's IsoLogic high-speed isolator technology, each line of the AD260 offers data rates from dc levels to 40Mb/s with a propagation delay of 14ns.

Further enquiries
Tel: 03 5986 7755
www.aee.com.au
Enquiry number: 1770

LEDs with Integrated Lenses

Arrow Veltek has released a series of surface-mount chip-type light-emitting diodes equipped with integrated lenses from Hewlett Packard. According to Arrow, these lenses, which concentrate the emitted light into a typical 70° viewing angle, produce double the on-axis light intensity of non-lensed surface-mount chip LEDs using the same active die. This makes these LEDs particularly suitable for illuminating buttons and switches on panels, and for transferring the maximum amount of light to optical light pipes used to illuminate panel legends.

These surface-mount LEDs are designed for high-speed automated manufacturing technology. The 3.0mm by 1.5mm package closely matches an industry-standard size for many chip capacitors, making it compatible with available automated pick-and-place equipment. The package also is compatible with infrared and convective reflow soldering processes used in automated assembly.

All units are specified for 70° viewing angle. Units are supplied on 8mm tape on 180mm diameter reels containing 2,500 parts.

Further enquiries
Tel: (03) 9574 9300
www.aee.com.au
Enquiry number: 1775

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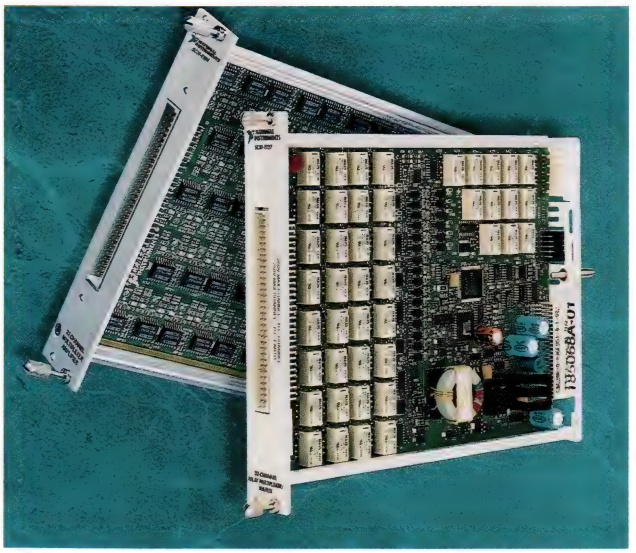
SCXI modules



National Instruments has released two modules for SCXI signal conditioning systems. The SCXI-1104 solves mid-level voltage analogue input applications and the SCXI-1127 offers matrix/switching solutions.

The 1104 is a 32-channel multiplexer that can read voltage levels up to ±42V. It is suitable for applications involving monitoring signals outside of the working input range of a DAQ card, such as 12V or 24V signal sources. Each module multiplexes the 32 conditioned signals into a single channel of the DAQ board or module. Each channel includes precision attenuation circuitry, an instrumentation amplifier, and a lowpass noise filter, allowing it to scan channels at up to 333KS/s.

The 1127 is a high density armature relay device that can act as a multiplexer or matrix module. As a multiplexer, it can operate in several modes, including 1-wire for large channel-count systems, 2-wire for differential pair systems, or 3 an 4-wire modes for resistive measurements including RTDs and thermistors. With SCXI front-mounting terminal, it operates as an 8x4, 2-wire matrix switching mode or as a 32x1, 2-wire multiplexing module. It is designed to work with both low and high voltage levels. For low-voltage measurements it uses low thermal offset to ensure accurate measurements. The same relays can handle up to 250Vrms at 200mA, allowing it to route power to external devices.

Further enquiries
Tel: 03 9879 5166
www.aee.com.au
Enquiry number: 1771

VME 64 Connectors

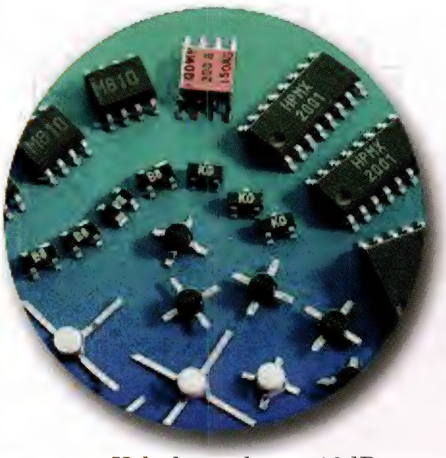
Australian AMP is offering connectors for VME64 and VME 64 Extension backplanes. These are the 64 bit offering of the VMEbus. The connector specified by these standards is a 160 pin derivative of the 96 pin Eurocard.

These connectors are the receptacle (backplane) half of the two piece board to board system. 6mm and 17mm contact lengths are available. The connectors feature compliant pins for ease of installation and require no special installation tooling.

The VME connectors are compatible with standard three row Eurocard pin headers manufactured in accordance with DIN 41612 and IEC 60603-2 specifications.

Further enquiries
Tel: (02) 9840 8200
www.aee.com.au
Enquiry number: 1780

Schottky-Barrier and Pin Diodes



Arrow Veltek has announced, from Hewlett Packard, six-lead SOT-363 packaging with the same outside dimensions as the SOT-323 three-lead package for its line of PIN and Schottky-barrier diodes.

HSMP-38xa series PIN diodes are optimised for switching applications requiring low resistance at low current and low capacitance. The low distortion HSMP-386x series is available as three unconnected diodes. The 389R provides a PIN diode quad for multimode switching. The 389V high-frequency series-shunt pair offers an approach to transmit-receive switches in which a quarter-wavelength transmission line is used for phase shifting. The HSMS-28xK is a series of high-isolation, unconnected pair diodes. The isolation between the two diodes in the unconnected pair is up to 10dB greater than in the much larger SOT-143 package, due to a grounded metal strip incorporated between the diode chips.

The HSMS-286K high-isolation, unconnected pair of high-frequency dc-biased detector diodes is designed to meet the requirements of passive, active, read-only and read-write radio-frequency (RF) systems operating in the 915MHz, 2.45GHz and 5.8GHz frequency ranges.

Further enquiries
Tel: (03) 9574 9300
www.aee.com.au
Enquiry number: 1773

0.25 micron SRAMS

Cypress Semiconductor, represented in Australia by Braemac, has introduced a family of micropower SRAMs. The More Battery Life (MoBL) SRAMs increase battery life in new-generation wireless products such as cellular phones, pagers, hand-held electronic games, and personal digital assistants (PDAs). According to Braemac, they use up to 90% less power than current standard, low-power SRAMs.

The devices operate over a voltage range of 3.3V to 1.8V, and dissipate 3mA at 1.8V in active mode. To further reduce this power, the MoBL architecture monitors the processor's request for data, and automatically powers down into standby mode during periods of low activity. This standby power is typically 1µA, and there is no time delay to power up the SRAM and transfer the next piece of data. MoBL SRAMs also offer access times of 70ns at 2.7V and 100ns at 1.8V over the industrial temperature range.

MoBL SRAMs are manufactured on Cypress's 0.25-micron, six-transistor cell RAM5 process. They are available in 7x7mm 48-ball FBGA and standard 44-pin TSOP packages.

Further enquiries
Tel: (02) 9550 6600
www.aee.com.au
Enquiry number: 1774

Large-Format Printers

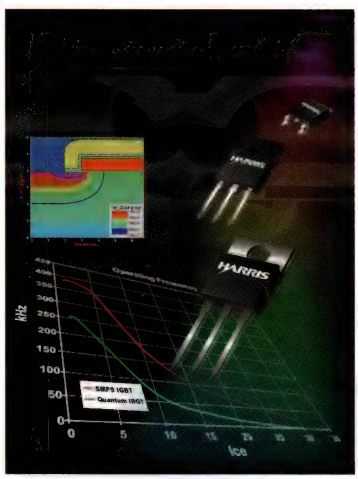
Hewlett-Packard has announced a new generation of high-speed, best-line, text and near-photographic-quality large-format printers. The HP DesignJet 1000 Series colour thermal inkjet printers, which consist of the HP DesignJet 1050C and the HP DesignJet 1055CM printers, can, according to HP, produce a draft colour D/A1-size engineering drawing in less than one minute.

The fast, easy-to-use printers offer 600x600dpi for colour prints and up to 1200x600dpi for black-only prints, enabling the precise lines design professionals need. They print up to six times faster than the HP DesignJet 750C Plus.

HP's JetExpress technology enables these print speeds through wider printheads and an increased number of nozzles. This series of printers four 1in printheads each have 512 nozzles and yield a 0.85in print swath. The modular ink system consists of four HP No. 80 individually replaceable ink cartridges. They support roll media of up to 91.4m. They can handle up to 30 prints per day.

Further enquiries
Tel: 1800 339 862
www.aee.com.au
Enquiry number: 1783

SMPS IGBTs



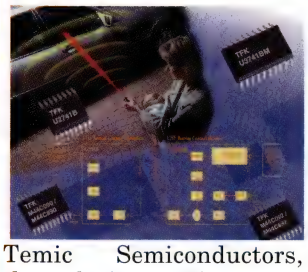
Avnet Electronics Marketing has announced Harris Semiconductors' 'Switch Mode Power Supply' (SMPS) IGBTs with switching speeds at frequencies up to 200kHz. Parallel MOSFET networks can now be replaced with economical, rugged SMPS IGBTs in many high-speed switching applications.

The first product in the family is the HGTP12N60A4, a 12A 600V IGBT that operates at 150kHz at the rated current. The complete range will cover 3 to 40A at 600V, with a family of parts in TO-220, TO-247 and TO-263 industry standard packages. The device operates at frequencies up to 200kHz.

By replacing MOSFETs with IGBTs, the power output of a design can be increased, heat sink size can be reduced and with higher switching frequency reduced input EMI.

Further enquiries:
Tel: 132 732
www.aee.com.au
Enquiry number: 1776

Wireless Control System Solution



Temic Semiconductors, through Avnet Electronics Marketing, has released a chipset for Wireless Control Applications. The chipset consists of three ICs, the U2741B RF Transmitter, the U3741BM RF Receiver, and the M44C890 Microcontroller.

Specifically designed for end applications such as Remote Keyless Entry and remote control alarms, the system operates over the 300 to 450MHz band and supports both ASK and FSK modulation.

The highly integrated architecture of the U2741B and the U3741BM keep the external parts count to a minimum and reduce the complexity of the design task. The chip also offers frequency stability and a very low current consumption resulting in extended battery life.

For the U2741B and the U3741BM, application kits and detailed design guides with application information are available. For the M44C890, development tools such as an emulator board, qForth software library and compiler, software simulator and a programmer's guide can be provided.

Further enquiries:
Tel: 132 732
www.aee.com.au
Enquiry number: 1778

Low-power ADC family

Exar Corporation, via Braemac, has released three low-power analogue-to-digital converters for communications, imaging, video and industrial applications. The XRD64L06, XRD64L40 and XRD6202 are monolithic converters produced in standard CMOS.

The 64L40 and 6202 utilise design architecture that interleaves ADCs to offer maximum conversion rates. All three devices contain a track-and-hold so external components are minimised. All are TTL/CMOS-compatible with tri-state output buffers.

The 6202 is an 8-bit, 68MS/s ADC at 5V with input capacitance 5pF, and power dissipation 215mW. It can interface directly to 5 or 3V digital buses, and contains autocalibration to continuously maintain device accuracy over time and temperature.

The 64L40 is a 10-bit, 20MS/s at 3V with input capacitance 5pF, and power dissipation 76.5mW. The device can interface with a 3V digital bus and also contains autocalibration.

The 64L06 is a 10-bit, 6MS/s ADC at 3V with a power dissipation of only 42mW. It has a sub-ranging flash-based architecture.

Further enquiries
Tel: (02) 9550 6600
www.aee.com.au
Enquiry number: 1782

For more information on any of the products or advertisements in this issue, visit the *AEE* website *www.aee.com.au*

Quick & Easy CAD

Unigraphics Solutions has released version 6 of its Solid Edge CAD software. Intended for moderate to complex plastics, cast and sheet metal parts design, this version has added more than 200 customer requested enhancements.

Unigraphics' STREAM technology, the source of the versions 'intuitive' abilities, uses inference logic and decision management to ascertain the designer's intentions. It then automatically completes basic processing and non-design related tasks allowing the designer to concentrate on design issues requiring human creativity and intelligence.

Further enquiries Tel: 1800 659 758 or www.aee.com.au Enquiry number: 1777

Complex logic designs

Cypress Semiconductor, represented in Australia by Braemac, has released a family of Ultra37000 CPLDs, supported by release 5.1 of Cypress's Warp2 design tools. The Ultra37000 family includes 5V and true 3.3V versions of the 32-macrocell CY37032(V), the 64-macrocell CY37064(V), the 128-macrocell CY37128(V), the 192-macrocell CY37192(V), the 256-macrocell CY37256(V), the 384-macrocell CY37384(V), and the 512-macrocell CY37512(V).

Further enquiries Tel: (02) 9550 6600 or www.aee.com.au Enquiry number: 1785

Universal Retention Module

Australian AMP is offering a low-cost, universal support system for the Intel Pentium II, Celeron, and Mendocino processors. This mechanism utilises a patent pending folding arm support system. This system eliminates height constraint concerns for packaging and shipment of motherboards. The modules are compatible with AMP Slot 1mm card edge connectors. Moulded plastic latches and features have been developed to interface with all processor types. A pivoting design offers reduced shipping height and also separates the latching features for the two different processors.

Further enquiries Tel: (02) 9840 8200 or www.aee.com.au Enquiry number: 1786

Piezo-ceramic speakers

Available through RVB Products, Sonitron has released the SCS series piezo-ceramic speakers. The speakers feature ultra-low power consumption, yet are able to deliver audible output in harsh, hot, and moisture laden environments. Frequency response ranges from 100Hz to 20kHz. They come in sizes ranging from 17mm square to 77mm square. The range also includes warning devices and buzzers capable of delivering 100dB at 1 metre.

Further enquiries Tel: 03 9580 0688 or www.aee.com.au Enquiry number: 1767

Wideband Data Capture

The SomerData HBVDR from Record Data is a versatile high-rate data recorder for radar, electronic warfare, communications and network signal capture applications. A modular system, it can be used to record and regenerate high bandwidth signals using solid-state memory as the primary storage medium.

HBVDR is available with high-speed signal acquisition and regeneration input/output data interfaces including baseband digitisation and solid-state capture/replay of up to three wideband signals.

Further enquiries Tel: (02) 9439 8399 or www.aee.com.au Enquiry number: 1779

SCADA/HMI DAQ software

IOtech has released, through Scientific Devices, ScanServer, a 32-bit server software application that enables IOtech's measurement and control instruments to be used in SCADA and HMI applications. With ScanServer these instruments deliver high-channel capacity, expandability, speed, accuracy, and low cost per channel to the factory automation and process control markets.

Further enquiries (03) 9569 1366 www.aee.com.au enquiry number: 1787

External RAID Storage

Interworld Electronics has released the 6533-RAID from Industrial Computer Source. The 6533-RAID array is designed for high performance, scalability, easy host-interface, and complete data protection for RAID levels 0, 1, 0/1, 3, 4, and 5. It provides simplified array management and configuration with Adaptec's CI/O management software.

Up to four controllers may be installed. It is operating system independent and supports all platforms with no special software or drivers required. One controller can support up to 15 disk drives on each Ultra SCSI device channel delivering up to 40Mb/s throughput. Two independent PCI memory controllers enable dedicated parity and data caching for maximum performance during multiple read/write operations.

It includes a high performance NiMH battery that offers up to 72 operating hours for 20Mb of cache memory.

The rack mount chassis is made of gold zinc plated, cold rolled steel

Further enquiries
Tel: (03) 9563 5011
www.aee.com.au
Enquiry number: 1781

Sensor image input board

Available through Unitronix, Primagraphics has introduced the Jaguar card to facilitate the input of images and data from special sensors into its CAT image processing systems. The card accepts a wide range of digitised, real-time sensor inputs, including radar, linescan and sonar data.

When used for radar, the card's 8Mb of VRAM is partitioned as dual 2k x 2k polar stores, or single stores, or a single polar store with 2k azimuth and 4k range cells. Its Synchronous Data Channel interface supports dual data sources, each writing into separate areas of memory.

Based on the C80 processor with its RISC processor core and 4 integral DSPs, the CAT range allows the processing of video, sonar and radar from multiple sensors for display on multiple windows. The Jaguar contains 8Mb of dual ported RAM directly mapped to the memory space of the main processor and a parallel TTL compatible interface which can accept data at a rate of up to 40Mb/s.

Further enquiries
Tel: 02 4973 4926
www.aee.com.au
Enquiry number: 1772

For more information on any of the products or advertisements in this issue, visit the *AEE* website *www.aee.com.au*

Integrated line transmitter

Now available from Braemac is Exar's fully-integrated line driver for transmitting signals at E3, DS3 and Sonet STS-1 speeds (34.386Mb/s, 44.736Mb/s and 51.84Mb/s respectively). The XRT7298 complies with all relevant transmission standards, making it suitable for applications such as digital cross connect, CSU/DSU interfaces, PCM test equipment, fibre optics terminals and add-drop multiplexers.
Further enquiries (02) 9550 6600 www.aee.com.au enquiry number: 1788

LEDs for outdoor signs

Arrow Electronics has released a series of 5mm Hewlett-Packard LED lamps designed specifically for full-colour video outdoor signs, as well as for single colour information signs. The advantages of LED displays over CRT based systems include power consumption, weight, thinness and reliability. Some sign manufacturers have cited power reductions of as much as 20%.
Further enquiries (03) 9562 1520 www.aee.com.au enquiry number: 1789

PC/104 modules

Backplane Systems Technology has released two new PC/104 modules. The first is a highly integrated 386SX-40 CPU module with 4Mb DRAM, two 16C550 RS232 serial ports, ECP/EPP parallel port, HDD and FDD controller, LCD/CRT controller and keyboard/mouse connector, single +5Vdc supply and draws 7W.

The second card integrates two functions on one card, 10Mbps NE2000 compatible Ethernet and two DiskOnChip Flash memory sockets.
Further enquiries (02) 9456 5400 www.aee.com.au enquiry number: 1790

Multichannel thermometer

Luxtron's Model 790, available from Warsash Scientific, is an accurate, general purpose multichannel thermometer designed for demanding temperature environments. It has fibre optic probe sensing technology and easily programmable operating features. The sensor responds in 250ms, with an accuracy of 0.1°C over a range of -200°C to 450°C. It has an adjustable-intensity LED display, analogue/digital outputs and software for direct logging on a standard PC.
Further enquiries (02) 9319 0122 www.aee.com.au enquiry number: 1791

In-circuit debugger

Available through Alfa-Tek is Advanced Transdata's ISD-SX28 in-circuit debugger. It comes with screen debugger which runs under Windows 95/98/NT and has a user friendly interface. All processor and application information is displayed on the front window, with separate windows for source code, program memory, data memory, special file registers, and watch variables. It uses real-time and transparent emulation.
Further enquiries (03) 9720 5344 www.aee.com.au enquiry number: 1792

PIN photodiodes

Optek Technology has announced the OP910 and OP910W silicon, PIN photodiodes mounted in hermetic, TO-18 packages, available through Logic 4. They respond linearly to light within the irradiance range of 0.2-3.0mw/cm^2. The typical rise and fall times for the devices are 10ns, which makes them suitable for high speed sensing applications. They have an operating temperature range of -65° to +125°C. The OP910 has a glass lens and an acceptance angle of ±12°C. The OP910W has a flat glass window and an acceptance angle of ±40°C.
Further enquiries (08) 8373 2811 www.aee.com.au enquiry number: 1793

CompactPCI/PXI digitisers

Acqiris has announced the release of a range of high-speed waveform digitiser products for use in computer-based data acquisition systems. The DP105 and DP110 are PCI compliant and plug directly into a PC bus to turn a computer into a digital oscilloscope. The DC110 is a 3U CompactPCI/PXI module for use in modular data acquisition systems.
Further enquiries (03) 9877 9322 www.aee.com.au enquiry number: 1794

DIARY

AUSTRALIA

AMTA Australian Mobile Communications Congress
March 2-4, Wentworth Hotel, Sydney
Contact: David Jarvis, tel (02) 9210 5727, email *djarvis@aicconf.com.au*

Wireless InfoComms Australia Exhibition
March 2-4, Wentworth Hotel, Sydney
Contact: David Jarvis, tel (02) 9210 5727, *email* djarvis@aicconf.com.au

ANSI/J-STD-001B Operator and Inspector
March 8-10, Sydney
March 17-19, Melbourne
Contact: Andrew Pollock, tel (03) 9568 0599, fax (03) 9568 0622, *email* pollocka@smbca.asn.au

Software Engineering for Defence & Aerospace
March 15-19, Sydney
May 3-7, Melbourne
May 24-28, Adelaide
Contact: Technology Australia, tel (03) 9841 9733, fax (03) 9841 8374, *email* taa@taa.com.au

Space & Satellite Systems & Applications
March 22-23, Canberra
Contact: Technology Australia, tel (03) 9841 9733, fax (03) 9841 8374, *email* taa@taa.com.au

Communications Industry Self Regulation Summit
March 23-24, Darling Harbour Parkroyal, Sydney
Contact: David Jarvis, tel (02) 9210 5727, *email* djarvis@aicconf.com.au

High Speed PCB & System Design
April 12-13, Melborne
April 15-16, Sydney
Contact: SMCBA, tel (03) 9568 0599, fax (03) 9568 0622, *email* pollocka@smcba.asn.au

High Speed PCB and System Design
April 12-13, Holmesglen Conference Centre, Melbourne
Contact: Andrew Pollock, tel (03) 9568 0599, fax (03) 9568 0622, email *pollocka@smcba.asn.au*

Technical Reviews & Other Assurance Techniques in Major Projects
April 15-16, Canberra
May 13-14, Melbourne
June 17-18, Sydney
Contact: Technology Australia, tel (03) 9841 9733, fax (03) 9841 8374, *email* taa@taa.com.au

Interconnect 99
April 27-28, Sydney Renaissance
Contact: Michael Turnley, tel (02) 9210 7773, Fax (02) 9210 5777

Real-Time Structured Analysis & Design
April 26-29, Melbourne
June 8-11, Sydney
June 29-July 2, Canberra
Contact: Technology Australia, tel (03) 9841 9733, fax (03) 9841 8374, *email* taa@taa.com.au

Software Independent Verification & Validation
May 10-12, Canberra
June 21-23, Adelaide
Contact: Technology Australia, tel (03) 9841 9733, fax (03) 9841 8374, *email* taa@taa.com.au

Nepcon 99
May 25-27, Melbourne Exhibition and Conference Centre
Contact: Stephen Bellette, Reed Exhibition Companies, tel (02) 9422 2518, fax (02) 9422 2555

AIEE i99
May 25-28, Melbourne
Contact: Shane Infanti, Reed Exhibition Companies, tel (03) 9245 7504

ACOFT 99
July 4-9, University of Sydney
Contact: IREE Society, tel (02) 9929 0099, fax (02) 9929 0587, *email* ireesoc@ozemail.com.au

Cards Australia 99
September 7-9, Sydney Convention & Convention Centre
Contact: AIC Worldwide, tel (02) 9210 5700, fax (02) 9223 8216, *email* cards@aicconf.com.au

Elenex 99
Sep 28 - Oct 1, Sydney Convention & Exhibition Centre
Contact: Australian Exhibition Services, tel (03) 9261 4500, fax (03) 9261 4545.

OVERSEAS

IPC Printed Circuits Expo 99
March 14-18, Long Beach, California
Contact: Lisa Williams, tel 0011 1 847 509 9700 ext.379,

Infocom 99
March 21-25, New York, N.Y.
Contact: tel 0011 1 732 949 8087, fax 0011 1 732 834 5906.

System-on-Chip Conference
March 22-24, Santa Clara, Calif.
Contact: tel 0011 1 415 363 0142, fax 0011 1 415 363 8768.

International Conference and Exhibition on HDP and MCMs
April 7-9, Colorado, USA
Contact: Ann Bell, tel 0011 1 703 758 1060, email *abell@imaps.org*

Hannover Fair 99
April 19-24, Hannover, Germany
Contact: Margret Lamy, tel (02) 9265 2211, fax (02) 9265 2211, email *margret.lamy@germany.org.au*

DSP World Spring Design Conference
April 26-28, Santa Clara Convention Centre
Contacts: Douglas St. John, tel 0011 1 415 538 3848, fax 0011 1 888 239 5563, email *dspworld@mfi.com*

Fifteenth Annual In-Stat Forum
May 2-5, Scottsdale, Arizona
Contact: Jack Beedle, tel 0011 1 602 483 4440, fax 0011 1 602 483 0400

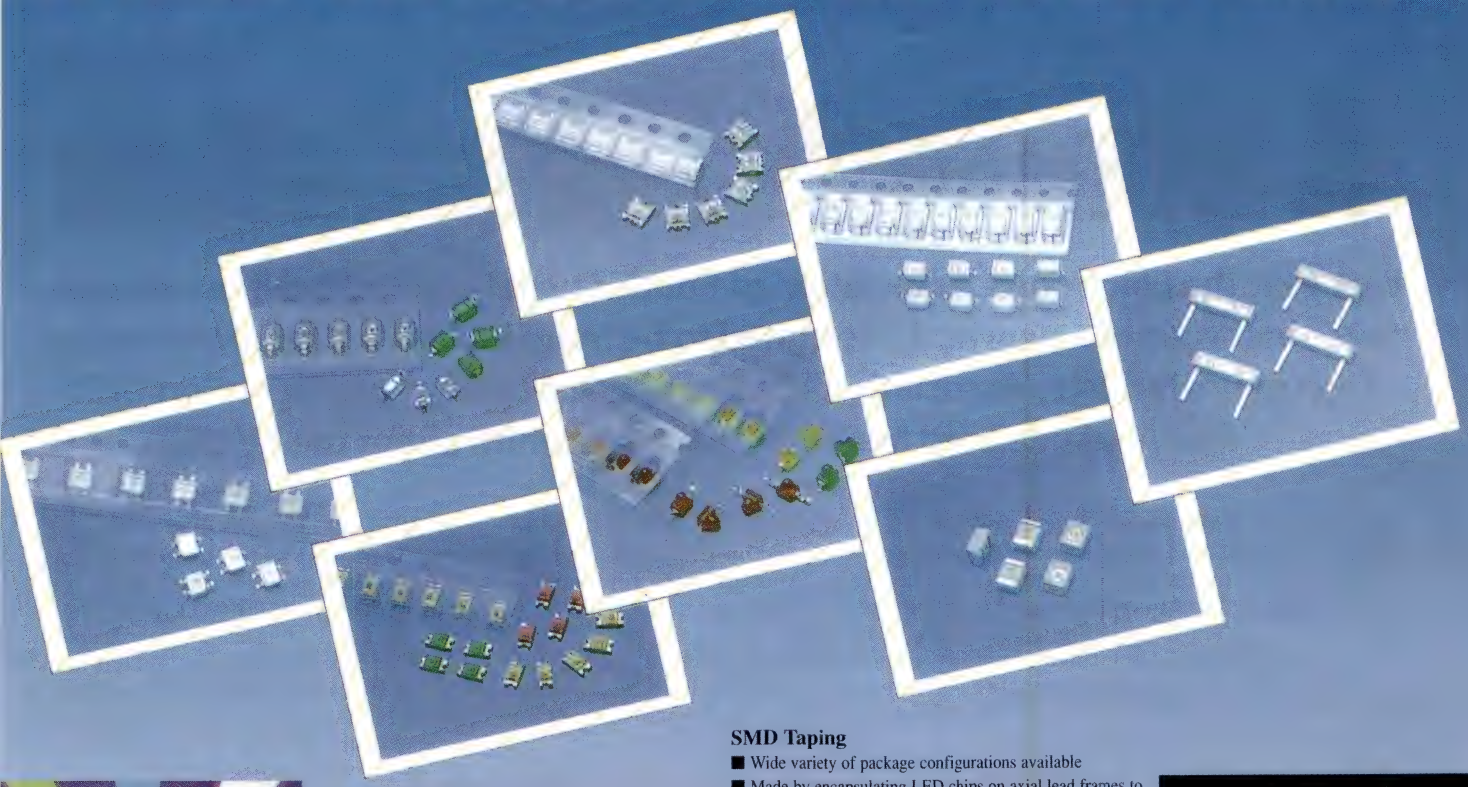
49th Electronic Components & Technology Conference
June 1-4, San Diego, USA
Contact: Jim Bruorton, tel 0011 1 864 963 6621, fax 0011 1 864 963 6521 email *margieballinger@kemet.com*

Embedded Systems Conference
June 28-30, Danvers, Massachusetts
Contacts: Wendy Lewis, tel 0011 1 650 691 1488, fax 0011 1 650 960 0541

Electronic Circuits World Convention 8
Sept 7-10, Tokyo International Forum
Contact: JPCA, tel 0011 81 3 5310 2020, fax 0011 81 3 5310 2021

Asian Industrial Expo
Sept 15-19, Hong Kong Exhibition and Convention Centre
Contact: Jasmine Sin, tel 0011 852 2865, fax 0011 852 2866 1770

The Latest SMD Technology and Various Forming



SMD Taping
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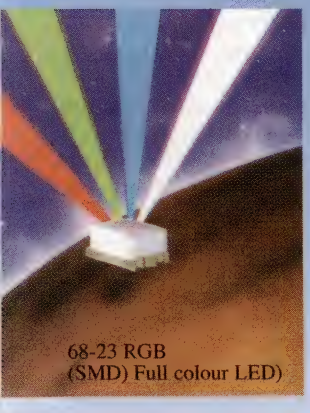

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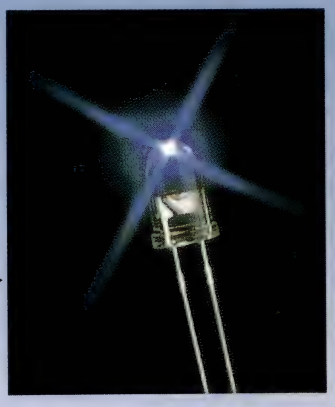

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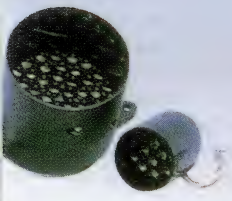

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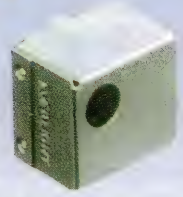

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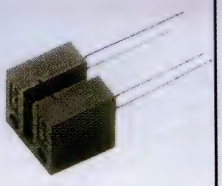

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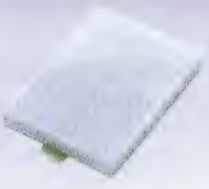

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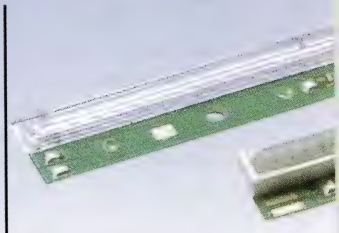

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EVERLIGHT

Enquiry number: 2134

A new look association

Last year the Electronics Association of South Australia voted itself out of existence in favour of a new body designed to be more inclusive. AEE spoke to the Electronics Industry Association's business development manager Ron Grill and Adelaide Lord Mayor Jane Lomax-Smith about the EIA.

At the AEEMA Forum last year, Codan's Mike Heard said: "The Australian electronics industry defines itself by the product it supplies rather than the market it supplies to." He then went on to outline the aims of the newly formed Electronics Industry Association of which he is president in South Australia, bringing together not just people who consider themselves part of the electronics industry but the customers of that industry, the education sector, the government and the community at large.

Ron Grill was president of the old Electronics Association of South Australia and on the initial board of the new Electronics Industry Association. He says that EASA was set up by people on the supply side of the industry "simply because they're the ones who got out and talked to each other. We knew that the market driven attitude was not something the manufacturing side of the industry was comfortable with and they saw us as a bunch of marketers rather than an organisation that had the technology at heart."

So, following a task force report it was decided to create a new organisation where the manufacturing sector clearly had the upper hand. "I was quite sure that the manufacturing sector was missing out on this kind of networking value," says Grill.

"They now have five of the nine elected members on the board. There's only one seat on the board for suppliers of goods to the industry and one for suppliers of services. The two other members are from the graduate or post-graduate education sector and from the TAFE or para-professional sector. So the board we have now is an absolute reflection with the same colour spectrum you see out in the wider industry. Then you have a community representative because we think, as a bunch of techos, we need to be kept focussed on the benefits to the community. And the state government has a seat on the board in the same advisory capacity."

The community representative on the EIA board is Adelaide Lord Mayor Jane Lomax-Smith. She describes it as an unusual position. "But in my position as Lord Mayor I have to reflect on the economic future of the city and the economic advantages we have as a community. And it's quite clear we haven't got the Olympic Games and we haven't got the infrastructure; we have a smaller population. But what we do have is the intellect and drive and creativity. And that can actually give us an edge. The council has identified six economic drivers and the IT/electronics sector is clearly one of those major growth areas. The way to get ahead today is to be creative and collaborative and communicate well and that's really, to my mind, what the EIA can do."

She perceived two issues. "One was the opportunity to synergise across the industry sector, and the other was in education and training. You get better marketing and yield and return and R&D results if you work together," she says.

"Our industry employs 1.2% of the total workforce in South Australia, produces 3.8% of the gross state product but it spends about 30% of the privately invested R&D dollars."

Grill says these were the two major issues identified by the taskforce. "The potential shortage of trained people we enumerated at 1150 by the year 2000. That, thankfully, has been reduced somewhat. The other was an upside. That was a 20% compound growth per year from 1994, which we projected forward to 2.5 billion by the year 2001. There were some people who thought that was a bit ambitious as a projection from 650 million to 2.5 billion. And there were others who thought the shortage of people might just be the educators beating a drum, wanting more money for their teaching programs."

He says they took the results of the taskforce and the idea for the association to the industry and the state government, where it was enthusiastically received. "The state government supported it to the tune of $200,000 as a setup grant over two years. But we are committed to being totally self sufficient at the end of that period. With 110 members we have a revenue base of $80,000 already from paying members. We need about $150,000 a year to do the sort of things that we want to do. And with some fee for service activities (publishing, web publishing, education and training specifically tailored for the industry people) we think that would get us there."

Both Grill and Lomax-Smith see a bright future for the electronics industry in South Australia. "Our industry employs 1.2% of the total workforce in South Australia, produces 3.8% of the gross state product but it spends about 30% of the privately invested R&D dollars," says Grill. "It underpins my belief that we have every reason to say that our industry is heading in the right direction." He also notes that he has had enquiries from other states and the EIA may be the model for the future of electronics industry associations in Australia.

BISS transistors
Breakthrough in small signal

BENEFITS

- high DC current gain at high currents
- longer battery lifetime in battery driven equipment
- less heat generation from the transistors
- low V_{CEsat} (voltage drop) which is extremely important for low supply voltage applications
- use of smaller packages

APPLICATIONS

- battery chargers
- electric motor control
- applications where newest semiconductor technology allows only supply voltages of 5V or lower
- battery driven equipment


SOT 23


SOT 223

In the battery-powered segment of the electronic industry, there is a constant need to develop superior, innovative products. By providing state-of-the-art technologies, you differentiate your products from your competitors. Philips Semiconductors have made a major transistor development resulting in a new generation of small-signal transistors - the BISS transistors.

BISS stands for Breakthrough In Small Signal. The breakthrough is illustrated in the exceptional performance of the first BISS transistors PMMT491A and PMMT591A. The collector-emmitter saturation voltage (V_{CEsat}) is less than half that of conventional types. The continuous collector current rating is double and the DC current gain performance is just outstanding. BISS transistors feature high performance with low power consumption transistors in the latest semiconductor technologies.

Where BISS transistors outperform conventional types:

	PMMT491A NPN SOT23	PMMT591A PNP SOT23	Conventional SOT23 types
I_C	1A	1A	500mA
V_{CEsat} at 500mA (50mA conventional types)	300mV	350mV	700mV
h_{FE} at 500mA, 5V	min 300; max 900	min 300; max 800	min 40 at 0.5A, 1V

The breakthrough in transistor development by Philips Semiconductors no longer means that "1A in SOT23" is impossible. BISS transistors are available not only in small signal transistors but also in medium power types. The newly introduced BDL31 and BDL32 medium power BISS transistors make "5A in SOT223" a reality.

	BDL31 NPN SOT223	BDL32 PNP SOT223	Conditions
V_{CEO}	10V	10V	
$I_{C\ cont}$	5A	5A	
$I_{C\ peak}$	10A	10A	
h_{FE}	>200	>200	I_C=1A, V_{CE}=2V
V_{CEsat}	<180mV	<250mV	I_C=500mA, I_B=20mA

Philips Semiconductors will soon extend the BISS transistors family to 1A in SOT323 and 2A in SOT89 packages. If you want your battery-powered products to operate longer than your competitors', the BISS transistors can make that happen.

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SC-89 / SOT490

BISS Transistors
1A in SOT23
5A in SOT223

The paradoxical demand for more power and smaller packages has forced design engineers to choose one or the other. Now Philips have made the solution easy with the introduction of the SC-89 super-small flat-lead surface-mount package offering decreased size and ease of mounting and the new BISS transistors which allow higher current capacity and gain that conventional types can't match.

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Vol.32 No1 JANUARY 1999

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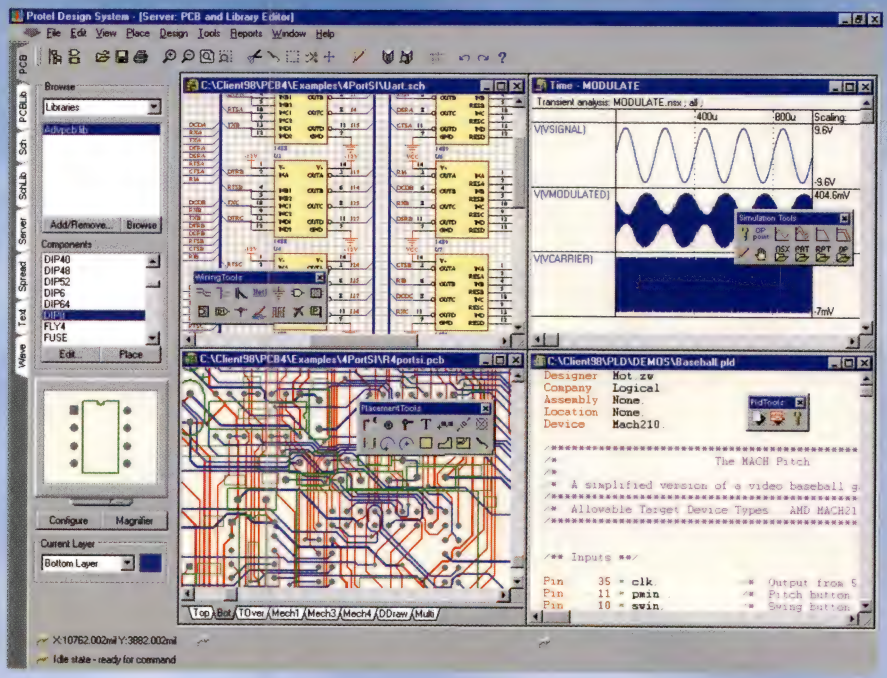

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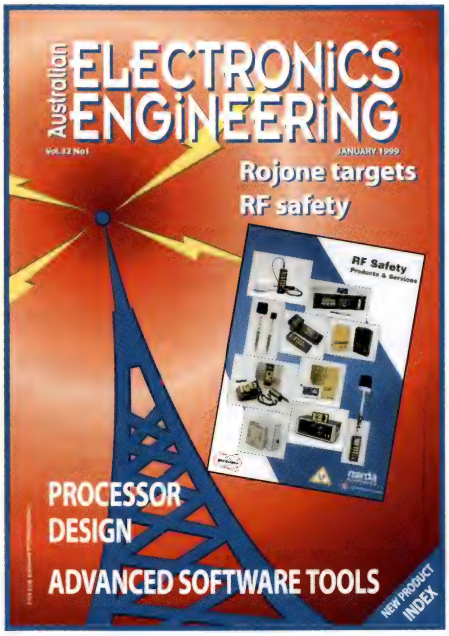

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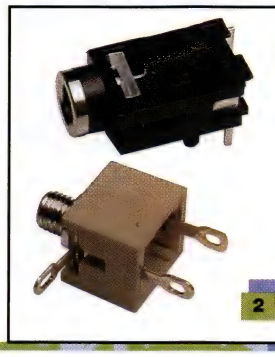
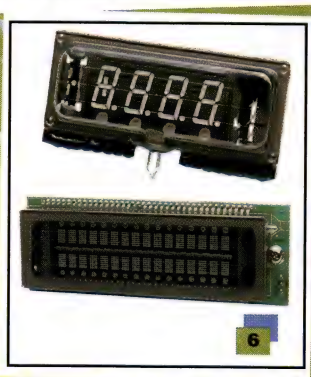
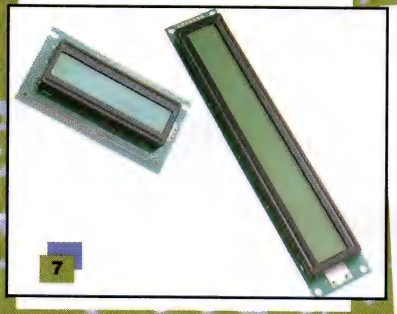
PICTURES SPEAK A THOUSAND WORDS







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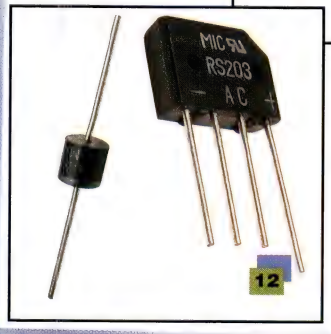

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1999: THE DAWN OF A NEW ERA?

So this is 1999. The year of the old Prince song where we're all partying like it's 1999. The year of the old television show Space 1999 where people are living on the moon but the moon isn't revolving around the earth any more; it's wandering aimlessly through the universe. I'm sure when they thought the idea up, 1999 seemed so far off in the future that anything was possible. And by the time it came around everyone would have forgotten the show existed anyway.

You would think then that I might learn something from this and shy away from making foolish predictions for the year ahead, particularly when none of the people in the industry I've spoken to recently profess to having any idea what the year holds for their companies let alone the industry as a whole. But no. It is the season for New Year's resolutions and foolish predictions. So here goes:

Prediction 1. Embedded microcontrollers will sell like hotcakes. This is an easy one. We're now entering the home straight with regards to the Year 2000 problem. The Australian Bureau of Statistics has reported that most businesses are making good headway in tackling it. However, the most troublesome area will be equipment with embedded microcontrollers. Many people have no real idea what will happen to this equipment when the bells ring in midnight on December 31. It may carry on regardless. It may stop. Or it may do something completely unexpected. As the meddlesome date draws nearer, a mild panic will take hold as the Millennium Bug prophets forecast all sorts of dire consequences from security systems collapsing to machinery turning on itself to the moon spinning out of its orbit. In the wake of this, microcontrollers that are Year 2000 compliant will become the product of the year.

Prediction 2. Contract manufacturing will be the hot topic of the industry. Another fairly easy one. Contract manufacturing is already booming in the US and Europe and it seems inevitable that Australian operations with US and European parents will start outsourcing their manufacturing more and more. Speaking to the founders of Bluegum recently (see *Out of the Blue* on p.34), I was left with the feeling that if it was not them, it was going to be someone else moving into the industry in a big way. In recent years, we have seen big overseas component distributors such as Arrow, Avnet and Memec moving into the Australian market. And contract manufacturing looks set to be the next target.

Prediction 3. The Australian economy will pick up. It may be wishful thinking but I think there are a lot of good signs for Australia. It has weathered the Asian crisis fairly well. And the signs are that the Asian economies themselves are turning around. Whether they boom again is a moot point. But given the size of Asia, it doesn't really matter whether the economy is booming or trundling along steadily. It will still provide a lot of opportunities for exporters here. Many financial observers also believe the Australian dollar will strengthen after the Euro supplants all those European currencies. The theory is that money market players investing in a number of European currencies aren't going to transfer that entire investment into the one currency. They will want to spread it out over a few strong currencies and the Australian dollar will rise in status as a result.

So there you have it. By January next year, we'll know what really happened. And if my predictions are less than accurate? I'll go back to Prince's excuse in 1999 and say: "I was dreaming when I wrote this." ●

Christopher Connolly

Making the right connections

The electronic connector market is undergoing a worldwide shakeup with market leader AMP being taken over by US-based manufacturing and service company Tyco. Meanwhile, third placed FCI has bought fourth placed Berg to leapfrog into second position. The feeling in the industry is this is part of a trend towards more mergers and acquisitions. The big question is, who's next?

The AMP deal involves it merging with a subsidiary of Tyco. AMP had been facing a hostile takeover bid from AlliedSignal so Tyco is being seen by AMP as something of a white knight. AMP CEO Bob Ripp said, "Tyco is well recognised for management strength and willingness to invest in business for growth and manufacturing productivity."

Australian AMP general manager Robert Jarvis said the merger with Tyco would be a very positive step, giving the company access to many more markets. "We are now a $23 billion company rather than a $5.7 billion one."

He wasn't sure what effect it would have on the local management structure but thought it would probably stay much the same. He said Tyco's president had often talked about maintaining autonomy and accountability in its other takeovers. Tyco in Australia is best known through its subsidiary O'Donnell Griffin.

The other major move was FCI's takeover of Berg. FCI (Framatome Connectors International) is a French-based connector company serving the electronic, automotive, microelectronics, electrical and aerospace industries. Berg is based in the US and serves the telecommunications, data, industrial and instrumentation markets. FCI made an offer of $35 a share for Berg stock in August 1998 and the deal was completed in October.

Arthur Franson, FCI vice president, marketing, Asia Pacific, said the combined resources of FCI and Berg would equate to around US$1.9 billion in sales, 65 plants in 38 countries, and 16,280 employees.

He believes the deal is a complementary one in many ways. "Berg is traditionally strong in computers, whereas FCI isn't. However, Berg is not big in the automotive industry. FCI is." Given FCI's strength in Europe and Berg's North American base, he thinks the combined company will be truly global with roughly 40% of its sales in Europe, 40% in the US and 20% in the rest of the world.

FCI national sales and marketing manager Bruce Ogden agreed with the suggestion that it was a complementary deal. "FCI in Australia is 80% electrical business so we really have a responsibility to grow the electronics side of it. In fact, the company was looking to expand its electronics influence worldwide. We have electronic products. We just don't have a name in that area."

He said the Berg name would probably continue as a brand and the preferred distributor in Australia for all FCI connector products would be the Arrow group of companies. Arrow's Stewart Booth said the company was already dealing with both Berg and FCI products and had combined sales of over $80 million in the last year. Both he and Franson were hopeful that figure would substantially increase next year with the companies' combined marketing weight behind it.

Franson suggests that given the worldwide focus on core competencies, there will inevitably be more mergers and takeovers within the industry. "It's an exciting time in the connector industry," he said.

The new breed of electronics engineers

Latrobe University's Department of Electronic Engineering held an awards presentation in December last year for its final year students.

The best oral presentation was awarded to Luke Enriquez (third from left) for his project *IF level digital multimeter using DSP*. He produced a novel form of radio receiver that used digital signal processing chips to perform work previously done by analogue circuitry. Luke believes radio receivers will be completely digital within ten years. He was awarded a prize of $100 from Future Fibre Technologies and a year's subscription to *Australian Electronics Engineering*.

Joining the students in the picture are department head Professor Laurie Cahill (far left) and lecturer Jim Royston (far right).

Robyn Reynolds (fourth from left) won the prize for best poster presentation for her project *Heart rate variability*. She used chaos theory to map variations in the human heart beat and developed both the hardware and software to do this. The phase diagrams her project produces allow rapid diagnosis of problems that may not show up in a conventional electrocardiogram. Robyn's prize was a digital multimeter and a year's subscription to *AEE*.

Smart card ventures in Victoria

The clean room facility at Gemplus's recently opened US$20 million Singapore plant.

Victoria is set to become the smart card capital of Australia with two recent major announcements. The first was the launch of Giesecke & Devrient's (G&D) smart card production facility in Knoxfield, Victoria in early November. The German-based company has invested more than $6 million in its Knoxfield plant and is expected to invest a further $4 million over the next three years.

Doron Ben-Mier, Marketing and Technology Director of G&D Australasia, said: "We have a worldwide reputation for producing cards of the highest quality, now we can deliver our products in a more timely and efficient manner with the added benefit of local engineering and product development resources.

"The GSM market is very strong over here and throughout Southeast Asia and that is obviously the focus of the business. We have a good starting base of market share in Australia for GSM and by virtue of our commitment we hope to grow that. As part of the global planning of G&D, we are a Southeast Asian manufacturing facility so we support our Southeast Asian subsidiaries in their efforts to provide cards to the various operators there."

The plant was officially launched in Victoria by the Parliamentary Secretary to the Treasurer and Minister for Information Technology and Multimedia, Robert Clark.

"Giesecke & Devrient will provide an important and welcome boost to the rapidly developing Victorian IT market which already boasts impressive names including Robert Bosch Australia, Anam, Ericsson Australia and Ascend Communications," Clark said.

The other announcement was a $32.5 million joint venture business for the manufacture of smart cards between Gemplus and Australasia's largest plastic card maker Leigh-Mardon in Melbourne. The multi-million investment is spread over three years and includes manufacturing machinery, personalisation equipment and technology transfer.

At the announcement was Victoria's Minister for Multimedia, Alan Stockdale, who said that aside from the multi-million investment, the venture was worth almost $200 million in import replacement.

"This joint venture will provide jobs, exports and investment for the future generations of Victorians in an industry that is just beginning to develop," he said.

"The smart card technology will contribute to Victoria's reputation as the smart state. The Victorian government is already in the process of developing ways to use smart cards in transactions with government through the Maxi system."

The joint venture includes the formation of a new company, L-M Gemplus that will operate out of Leigh-Mardon's existing site in Highett.

Already, 42 Maxi multimedia electronic commerce "kiosks" have been wired around the central business districts of Melbourne. Access is also available via the Internet and other dial-up or free-to-air services.

Gemplus Australasia's general manager John Atkinson said, "I believe it will greatly assist the rollout of smart card applications in Australia. We can, through this investment, bring Australia into the forefront of the smart card market." ●

By Norrie Blackeby

Smart card industry calls for privacy

The Asia Pacific Smart Card Forum has called on the Commonwealth Government to urgently reconsider the introduction of privacy legislation at a national level. Their concern is that State-based legislation may involve differences which make a uniform smart card industry privacy policy impossible.

There is already a Smart Card Code of Conduct in Australia - the first such code internationally for the industry.

Krone wins Argentine contract

Telecommunications manufacturer, Krone, has been awarded an order, by Telecom Argentina, to install its stationary radio technology, Wireless Local Loop (WLL). The order is worth in excess of AUD$56 million. Along with its other similar contracts in the region, this deal places Krone as one of the leading suppliers of WLL technology in Latin America.

Asia Pacific partnership

NetCom Systems and Wandel & Goltermann (W&G) have signed a partnership covering principle countries in the Asia Pacific region, including China and Australasia. W&G manufacture a broad range of communication testing instruments, while NetCom focuses on data networks testing products.

Electrical safety caution

Following an increase in the number of electrical accidents in the workplace, the Electricity Association of NSW has embarked on a campaign to remind electrical workers of potential hazards. Last year 17 people died and 202 were hospitalised in NSW alone, as a result of electrical accidents. This was two and a half times more than the previous year. Eight of the people who died were working in the electrical industry.

Soanar to distribute Saronix

Soanar, electronic component distributors in Australia and New Zealand, has signed on as a distributor for Saronix, a manufacturer of frequency control products. Soanar have been distributing products throughout Aus/NZ for 52 years. They now offer the full range of Saronix components.

Analogue mobile phone phaseout agreement

Minister for Communications, Senator Richard Alston, has announced that the government has reached an agreement with the three mobile phone carriers - Telstra, Optus and Vodafone - regarding the phaseout of the analogue AMPS mobile phone system in regional Australia.

Of the 400 base stations used by the AMPS network 130 will close on 31st December 1999, at least 135 will close on 30th June 2000 and the remainder will close by 31st December 2000.

The government will impose requirements on Telstra to replace the analogue network with an alternative digital network which provides reasonably equivalent coverage. Telstra has announced that they will use CDMA technology to construct a new network which will replace the AMPS network in both city and country.

In 1992 the Labour government made the decision that the network would shut down by 1 January 2000. However, this could no longer have been achieved without regional Australians "losing out," according to Senator Alston, and getting nothing in place of the old system.

The Senator congratulated each of the three organisations for their contributions. Telstra will be constructing the new system in a tight timetable and Optus and Vodafone, having the legal right to insist the analogue network closed by 1 January 2000, have put national interest ahead of their own short term interests.

The phaseout of the analogue AMPS network in metropolitan Australia remains unchanged with the service ceasing at midnight in 31 December 1999.

Semiconductor education pavilion at NEPCON

The Semiconductor Education Pavilion (SEP) will be introduced to Australia for the first time at Nepcon '99 in Melbourne in May this year. SEP has been a successful educational program for conference attendees, run as part of the Nepcon worldwide group of events, since 1984. Its focus is to develop further awareness and understanding of the Australian electronics industry via hands-on education in EDA tools, silicon technology, design in logic and microcontroller technology, and specialised skills in manufacturing activities.

In an effort to provide a one-stop educational and sourcing event, the pavilion has been designed specifically for vendors to effectively display their silicon devices and processes. These include microcontroller, CMOS, ASIC, FPGA, PLD, EPLD, BGA, flip chip and in-circuit programming utilities.

All participants will have qualified engineers on site, offering design and manufacturing solutions and advice. They will also perform demonstrations of their products, services and operations, to educate visitors in various design and manufacturing techniques and problems, as well as promoting new architecture; speed and capacity benefits; reductions in design costs and reductions in time to market.

Worldwide, Nepcon has, in the past, attracted a high calibre of vendors to participate in SEP, including Actel, Chip Express, Cypress Semiconductor, Lattice, Lucent Microelectronics, Motorola, Philips, Texas Instruments, Tower Semiconductor and Xilinx.

Veltek to distribute Invox

As part of a worldwide distribution deal with Arrow Electronics, Veltek, one of Arrow's Australian companies, will be making available the products and technology of Invox Technology from the USA. This includes their patented multi-level cell technology used in their audio recording and playback devices.

Altera chooses 3M

Altera has decided to use 3M Microflex BGA circuits in its programmable logic devices. The company said the decision was a result of the migration from 0.35mm to 0.25mm which creates serious challenges for footprint compatibility.

Nikolitsis joins Interworld

Interworld Electronics has announced the appointment of Frances Nikolitsis as marketing coordinator. Frances's role will be to facilitate the smooth running of the marketing functions and help drive the company's commitment to supplying premium quality industrial products and systems.

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AMTA Australian Mobile Communications Congress
March 2-4, Wentworth Hotel, Sydney
Contact: David Jarvis, tel (02) 9210 5727, email *djarvis@aicconf.com.au*

Wireless InfoComms Australia Exhibition
March 2-4, Wentworth Hotel, Sydney
Contact: David Jarvis, tel (02) 9210 5727, email *djarvis@aicconf.com.au*

High Speed PCB and System Design
April 12-13, Holmesglen Conference Centre, Melbourne
Contact: Andrew Pollock, tel (03) 9568 0599, fax (03) 9568 0622, email *pollocka@smcba.asn.au*

Nepcon '99
May 25-27, Melbourne Exhibition and Conference Centre
Contact: Stephen Bellette, Reed Exhibition Companies, tel (02) 9422 2518, fax (02) 9422 2555

AIEE '99
May 25-28, Melbourne
Contact: Shane Infanti, Reed Exhibition Companies, tel (03) 9245 7504

OVERSEAS

International Symposium on Product Quality & Integrity
January 18-21, Washington Hilton & Towers
Contact: tel 0011 1 202 483 3000

Programme Archives
January 26-28, Geneva, Switzerland
Contact: Mr Jean-Jacques Peters, tel 0011 41 22 717 27 21, fax 0011 41 22 717 27 10, email *peters@ebu.ch*

DesignCon99
February 1-4, Santa Clara, Calif.
Phone 1-312-559-4600.

International Acoustic Micro Imaging Symposium
February 18-19, San Diego, USA
Contact: Sonoscan, tel 0011 1 630 766 7088, fax 0011 1 630 766 4603 email *info@sonoscan.com*

IPC Printed Circuits Expo '99
March 14-18, Long Beach, California
Contact: Lisa Williams, tel 0011 1 847 509 9700 ext.379, fax 0011 1 847 509 9798, email *LisaWilliams@ipc.org*

Infocom '99
March 21-25, New York, N.Y.
Contact: tel 0011 1 732 949 8087.

System-on-Chip Conference and Exhibition
March 22-24, Santa Clara, Calif.
Contact: tel 0011 1 415 363 0142.

International Conference and Exhibition on HDP and MCMs
April 7-9, Colorado, USA
Contact: Ann Bell, tel 0011 1 703 758 1060.

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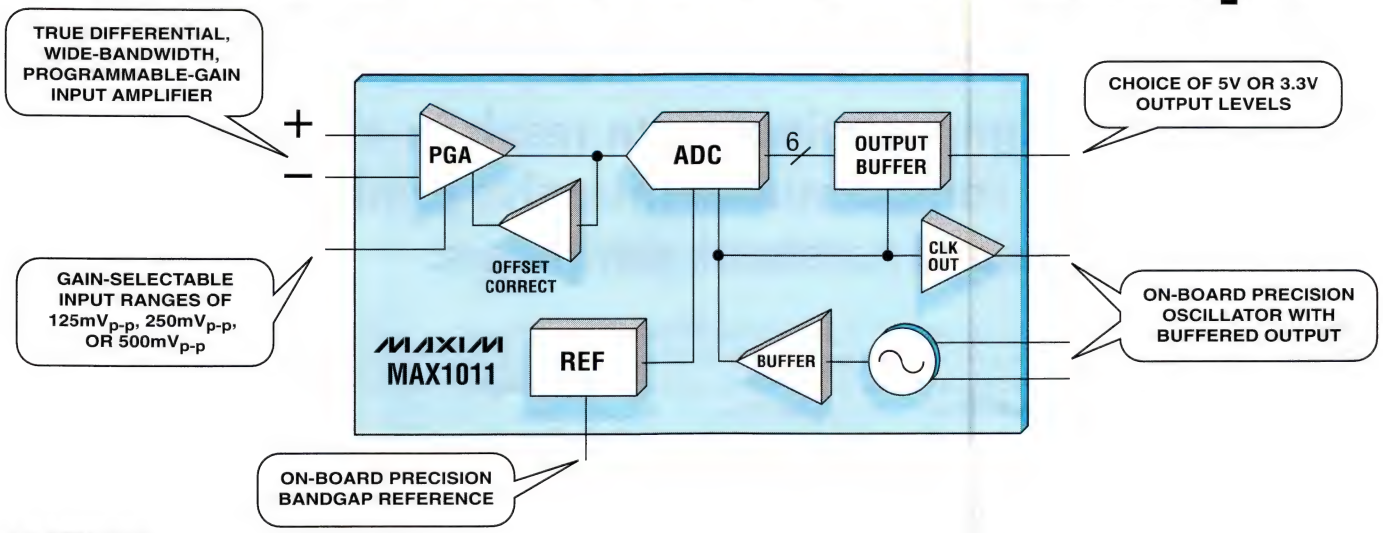

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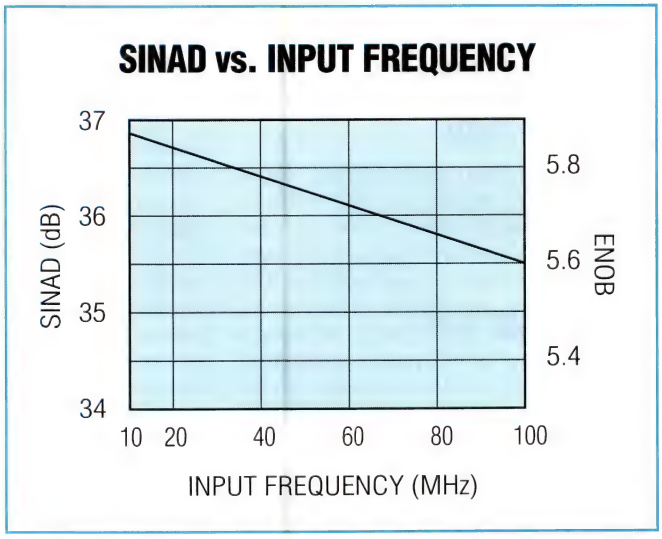

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Enquiry number: 1905

Low-power methodology & design techniques for processor design

Innovative design techniques can result in extended battery life in portable, computational-intensive products such as cellular telephones and notebook computers.

Designing for low power consumption requires addressing all phases of the electronic design process: architectural definition, logic entry, floor planning, circuit design, and optimal use of low-power process technologies (see *Figure 1*). An accurate power estimator coupled with useful power metric reporting is key to delivering first-pass hardware that meets the targeted power specification.

Power reduction methodology

A power reduction methodology must support power consumption feedback at the register transfer (RT), gate, or transistor level. Varying degrees of power calculation accuracy are expected at the various levels of design abstraction. Basic correlation must exist to assure that the benefits of power reduction changes at the HDL level result in corresponding reductions at the gate level and transistor level.

Accuracy at the gate level and good correlation to hardware are key factors for a reliable power reduction methodology. A power calculator's results are only as good as the available switching factor information. The power estimating tools used by the design team report the power information in a form so that the team could make the most informed decisions about where to prioritise its efforts.

Other factors that substantially affect the power calculation results are: the data values used in datapath or arithmetic units and the values and frequency of primary input and output switches. Ideally, in addition to being area- and timing-driven, the logic synthesis process must also be power-driven to observe a power budget. Automatic power optimisation algorithms that can be applied at the gate level are very desirable.

Power verification suite: Finding a set of representative applications that will yield power consumption close to the average power of the hardware is difficult. In battery-powered embedded applications, the microprocessor function is limited to the application code in the ROM. The range of applications is typically bounded; embedded applications spend most of their powered-up cycles in certain segments of code. This bounded code can confidently be used to characterise average dynamic operating power and identify instructions with high usage frequency.

BEH/RT power estimation/reduction: Since dynamic power consumption is directly proportional to the amount of switching activity, at the behavioural (BEH) or register transfer (RT) levels, switching activity can approximate the power consumption. Net and bus switching factors obtained from BEH/RT-level logic simulation can identify hot spots on which the designer's efforts should be focused. Once baseline behavioural switching factor information is obtained, pass-to-pass comparisons of the BEH/RT-level changes can verify the reduction of switching activity — and thus dynamic power.

Gate-level power calculation and optimisation: At the gate level, an accurate power calculation is possible, limited only by the accuracy of the gate power models and the extracted parasitics. Early on in the design process, estimated parasitics coupled with a zero-delay simulator provide enough accuracy, while post-wiring parasitics and nominal delay simulation are required for more accurate calculations later. Logic synthesis selects logic gate size based on net capacitance and/or slew-driven power minimisation.

Once estimated parasitics are obtained from a place and route of the gate level netlist, a nominal delay simulation is done to extract the network switching factors from the power verification suite. The slew-driven power optimisation tool is run to find the optimal slew rate and gate sizes for power consumption that may result in higher or lower powered books being selected (gates powered up or down). At this point, we have obtained minimum crossover current during CMOS switching while meeting the network timing constraints.

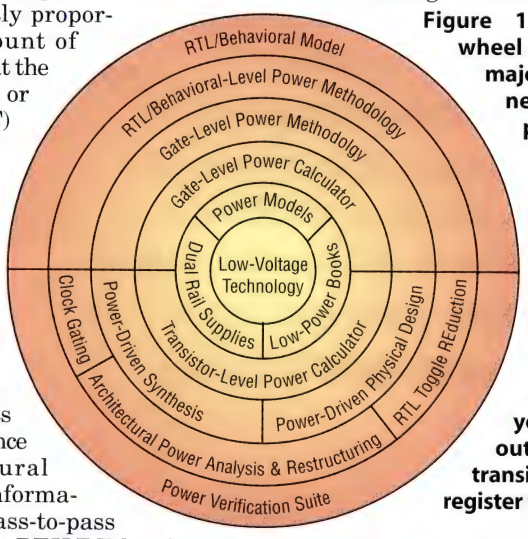

Figure 1. The power wheel depicts all major components needed for low-power design. At the centre are the low-power technology and supporting books models. As you move up in levels of abstractions, you go into the outer rings from transistor to gate to register transfer levels.

The correlation between BEH/RT-level power estimates via node toggles and gate-level power calculations varied from design unit to design unit from 5% to over 30% difference.

Power consumption reporting

The power consumption report is a key component of the power reduction process. A power consumption report must be detailed and formatted such that a designer can promptly implement power reduction changes.

Because the clock distribution net-

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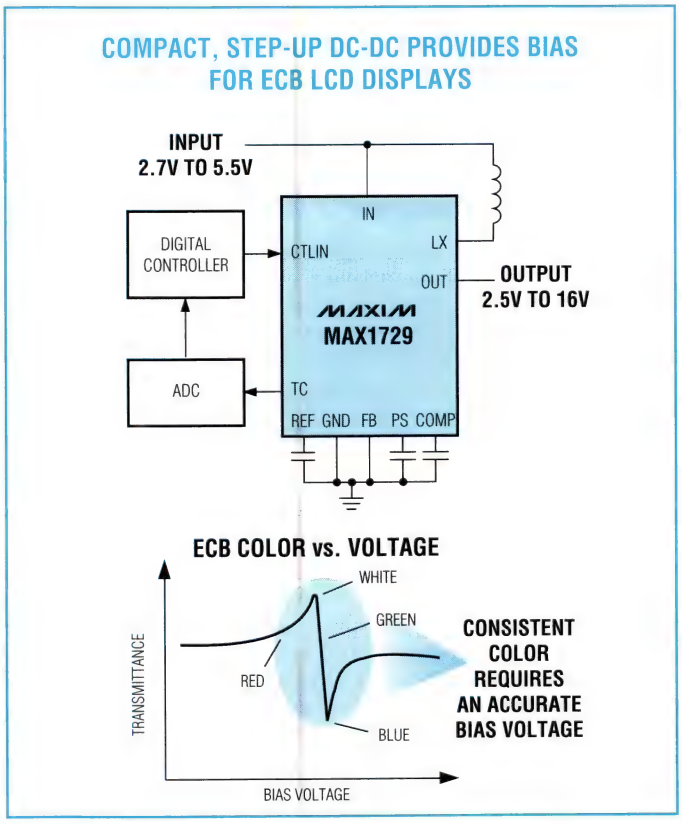

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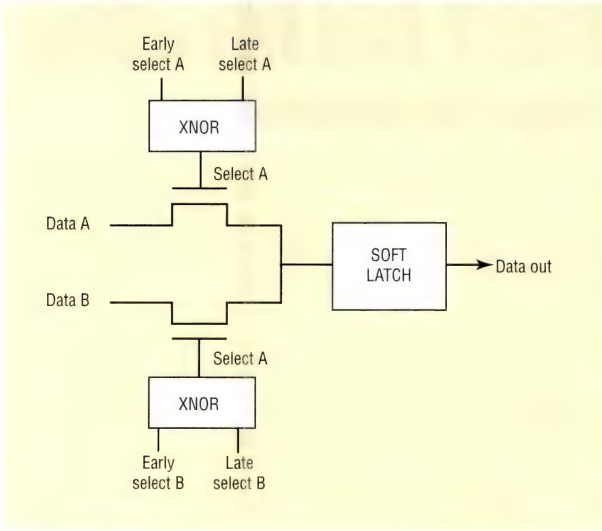

Figure 2. Two-port transition-once multiplexer schematic.

work can consume anywhere from one-quarter to one-half of the active power in a design, special attention must be given to the clock distribution network. Techniques such as clock gating have traditionally been used to manage clock distribution power. Our ASIC clock distribution methodology calls for a single clock to be distributed through a re-driven network to clock splitters, which create two non-overlapping, out-of-phase clocks. These clocks are then used to drive master/slave latches. We developed a specialised clock distribution power reporting program that post-processes the PowerCalc power report and gathers all the clock network power by unit and breaks it down by driver and splitter power. This data is very helpful when prioritising and structuring the clock gating logic and analysing the clock distribution network.

Dynamic power reduction

Cycle-to-cycle minimisation: The two main approaches to RT-level power reduction are first, to minimise the power required to implement a function, and second, to minimise how often the function needs to be executed. While the former approach reduces power, the latter can result in much larger power reduction. A new method of reducing AC power utilising pseudo-microcode, was devised to minimise cycle-to-cycle unnecessary toggles. In this method, next-cycle control signals are derived as a function of next-cycle function, along with the previous cycle state. The idea is a simple one: If a functional path is not required on the current cycle, ensure that all control paths and datapaths remain at the previous cycle's state, eliminating all node toggles.

Pseudo-microcode: The IBM microprocessor design chose a decode method that differs from other microprocessors. The two common decoding techniques are distributed decode, where each logic control signal is derived as an independent cone of logic, and microcode, where each opcode is translated to an entry point address to a read-only memory (ROM) or programmable logic array (PLA) that provides the complete set of control signals. We combined the simplicity of microcode with the flexibility of distributed decode in a style we call pseudo-microcode. For every opcode, all control signals that can be set by that opcode are bundled together as a total identity. These include the pipeline control, the address generation control, and the execution control bits. Upon each cycle boundary, a first-stage VWW dispatch is sent to n microcode units (22 for IBM microprocessor). The microcodes are decoded in each microcode unit for the instruction type. Once the instruction type is determined, then the value is set for every control signal within that microcode unit.

For every instruction decode, the control signals can be set to 0, 1 value, or the previous value. By changing only the signals that are required for that function, the power of the machine can be reduced. Each opcode becomes a function of the previous opcode, and only conflicting control signals need to be resolved.

An advantage of this type of microcode is the ability to embed logic within the microcode, such as conditional checks within an opcode type. This can reduce the number of microcode addresses, which in turn may reduce the overall size of the decode unit, saving power.

Controlling datapaths

Clock gating by opcode typing: Since the clock distribution network typically consumes a large percent of the processor power, clock gating - where the clocks are turned off to portions of the network that do not require them - can save a lot of active power. This mechanism works well for dataflow logic, where clocking requirements can be predetermined at least one cycle ahead. For control registers, clock gating is difficult within the current cycle due to the random nature of the control logic. In addition, the clock gating signals must be valid halfway into the cycle to gate off the capture clock.

An automated method for generating clock gating signals that attempts to maximise the number of latches that are turned off every cycle was developed. This method, called opcode typing, searches the microcode function and groups control signals into clock gating groups, with the goal of maximising the number of opcodes for which the signals in the clock gating group stay constant. Type generation is done with a program that iteratively picks different groupings of signals to be typed together, analyses opcode coverage, and picks the type groupings that maximise opcode coverage with the minimum number of groupings.

Once optimum clock gating groups are defined and opcodes have been assigned to types, typed clock gating can begin. Early in the cycle, opcodes are predecoded to generate a type field corresponding to the groups of registers. The current opcode's type field is then compared to the previous cycle type field. If the previous cycle type is ON and the current type is ON, clock gating can be enabled, since the control signals will be the same value from the previous opcode to the current opcode for that type. In the microprocessor decode, about 10 clock gating signals were generated for the registers, but this is entirely a function of the number registers and the amount of type coverage that one is trying to obtain.

Datapath toggle reduction: A common element in datapath processors is the bus multiplexer. The multiplexer selects one of several data buses to be driven onto a single output bus. If care is not taken, unwanted transitions on multiplexer inputs can propagate to the output buses and to downstream logic, even when the multiplexer is not used during the current cycle. The standard approach to multiplexer node toggle reduction is to hold previous value or to force the multiplexer to a constant state when not in use. In our application, this approach did not yield any significant power reduction when applied to heavily used multiplexers. While power is saved when the multiplexer is not used for many cycles, if the multiplexer is required to change values frequently, no significant power savings are observed.

An alternative method was created for datapath multiplexing. This method guarantees that the multiplexer outputs will switch once and only once during the cycle when they are needed, and never on cycles in which the multiplexer is not functionally needed. In a normal datapath design — due to individual path delay differences — different bits of a

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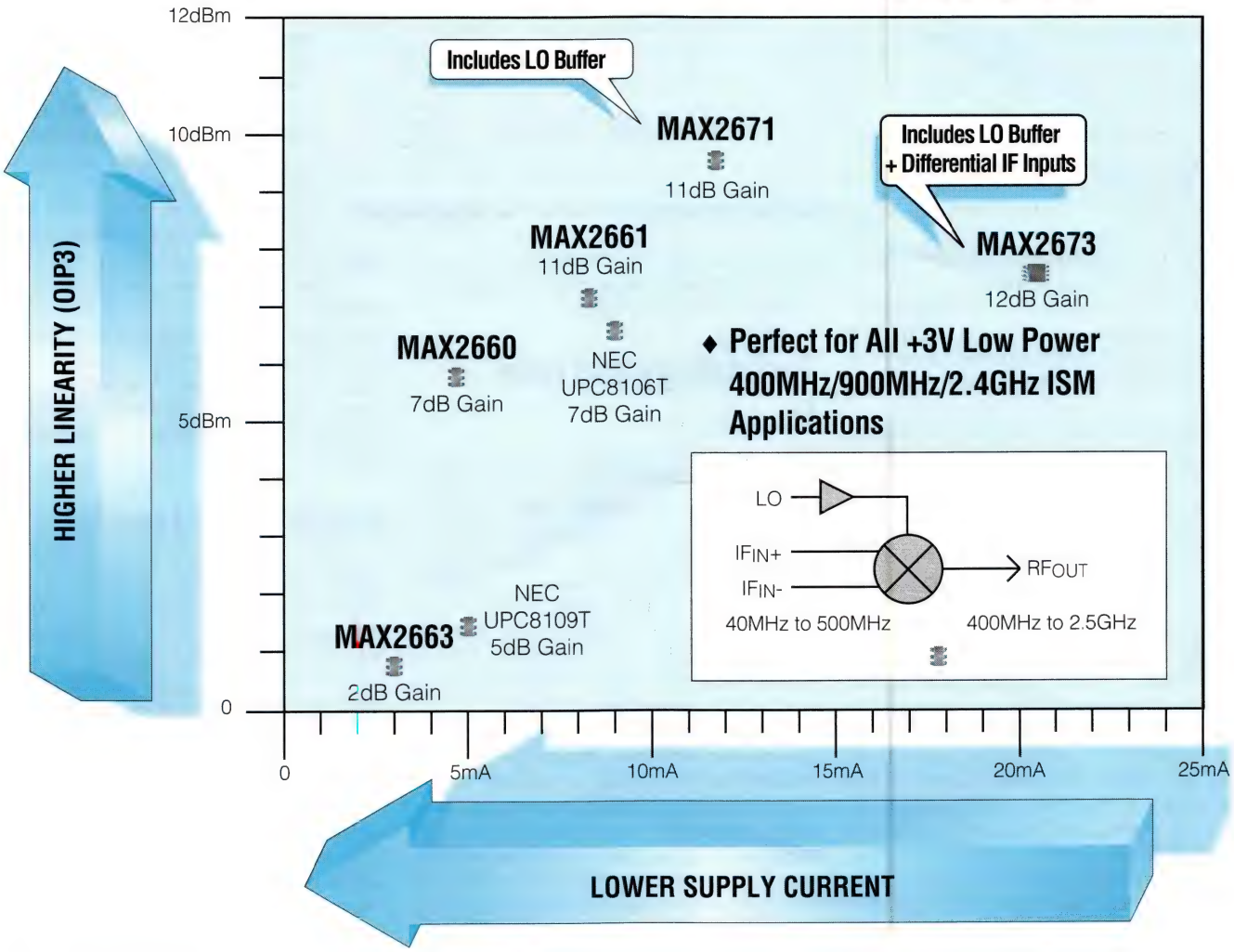

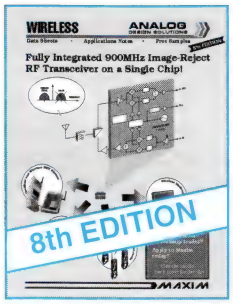

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bus will arrive at a different time within the cycle, which may result in repeated arithmetic or logical calculations downstream as an input bus settles on the final value for the cycle. To minimise datapath power, inputs to arithmetic units, such as multipliers, shifters, and adders, should be applied only once during the cycle in which they are used.

To achieve these goals, a new transition-once multiplexer was designed (*Figure 2*). The transition-once multiplexer ensures a single transition on the output bus per cycle by guaranteeing that data is propagated through the multiplexer only when the input data buses are valid and stable. The transition-once multiplexer holds the previous value when the multiplexer is not selected or during transitions to a new value. If the multiplexer is not selected in the current cycle, the output is held at the previous cycle's state.

Four rules exists for the transition-once multiplexer:

0. No new data until select off
1. No new select until new data
2. If no select, hold previous value
3. If same select, deselect (and hold previous value) during data transition time

To accomplish these four rules, two selects are defined for every data port. One select is called the fast select, and the second select is the slow select. The fast select was timed to be faster than the fastest data bit for that input port. The slow select was timed to arrive after the slowest bit of the same data port. The two selects are fed into an exclusive NOR (XNOR). Each select must be the same value (either both 0 or both 1) for the multiplexer input port to be gated to the output stage. Between the input stage and output stage is a soft latch, which holds the output state during either a selection to a new data port or when no pair of selects are active.

The transition-once multiplexer reduces toggles by filtering out transient changes in the input data from the output date. *Figure 3* shows how the multiplexer is used to either select a data path, reselect the same data path on another cycle, or deselect a path to hold previous data. The late select must be timed to arrive no earlier then the last input data transition. If the fast and slow selects are not timed to arrive at their optimal times, the only penalty will be a few toggles that pass through the multiplexer. By cutting down the intermediate transitions of data multiplexers and preventing false calculations of downstream logic from occurring, the transition-once multiplexer played a major role in the dynamic power reduction effort.

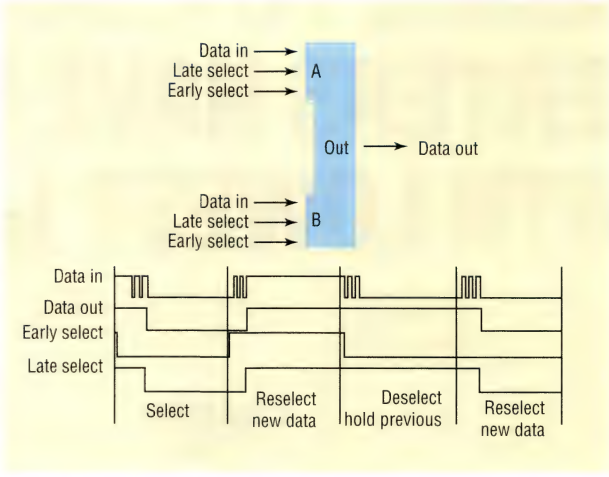


Figure 3. Two-port transition-once multiplexer timing diagram.

Technology and core library

In general, macro performance was optimised to meet low-power macro objectives. Quasi-differential drive latches were used to reduce the clock input loading by 80%. Low-power clock splitters are used exclusively to match low-power latches and enable clock gating. The ASIC library was expanded to include drive strengths with smaller device widths so power could be minimised on paths with non-critical timing.

An analogue PLL was designed with low-power features. Starting from an existing design that was built for higher performance chips, the maximum operating frequency was reduced from 400 MHz to 100 MHz. Clock shutdown modes specified by the chip architecture allowed the PLL to be commanded to suspend operation during chip sleep modes. Node toggling was eliminated on logic branches that are unused during a given mode of operation. DC paths were reduced or eliminated.

For the ROM, input addresses are latched only if a ROM access is requested. Next, partitioning and proper sequencing of the ROM timing events was orchestrated to minimise overlap of events that could cause DC paths or high power conditions. The word line decoder divides the 256-word lines into 32 parts of 8-word lines each. One part is active at a time. For each data output bit, only one of the 32-bit lines that could be accessed is pre-charged. Finally, ROM output data is held until the next ROM read is executed, reducing downstream switching.

The multiport SRAM used a number of techniques to minimise power consumption. Clock-gating was performed in the interface logic based on port request signals, minimising clock tree and latch power. The array was implemented using three sequential operations to a standard six-transistor cell to reduce area. Support circuits were fully interlocked, maximising the power/performance efficiency. To minimise array power, a NAND decode word-line system was chosen, and word-line length was kept to 64 bits, reducing bit-line pre-charge power and all associated sense amp and control signal power. Standby power was reduced, primarily by reducing sub-Vt leakage of the OFF word line driver PFET devices (greater than minimum channel length was used).

Technology leverage was used to reduce voltage to core logic from 2.5 V to less than 2.0 V. This results in a power reduction of over 20%. Power shutdown circuitry is incorporated into voltage regulators. A diode is used during shutdown mode to hold core voltage to non-critical circuits.

Summary and results

We have described a methodology and design methods for creating a low-power processor design. Designing for low power consumption requires attention to the entire design process, including: technology, ASIC library selection, power reduction methodology development, architectural and gate-level logic design techniques, and physical design methodology.

The complete HDL-to-gate level methodology described here successfully identifies, tracks, and implements a power-reduction strategy. Emphasis was placed on power reporting and analysis and automatic low-power synthesis capabilities.

Several innovative design techniques were described for dynamic power reduction, including register typing for control logic clock gating, a transition-once multiplexer to reduce datapath node toggles, and a pseudo-microcode approach to processor instruction decoding to minimise overall instruction stream-dependent power. ●

J Patrick Brennan, Alvar Dean, Stephen Kenyon, and Sebastian Ventrone are with IBM Microelectronics, represented in Australia by Braemac. *This article was reproduced with permission from IBM MicroNews.*

Advanced Software Tools for Embedded MCU Development

Steve Weddell researches some of the latest software tools for embedded microcontrollers.

Investment in more sophisticated and integrated software tools is generally seen as a way to reduce development time and give companies with innovative concepts, a competitive edge with reduced time to market. This article will discuss some trends with today's highly integrated development tools and outline current research into generic tool-sets. Such generic, re-useable tools will provide the benefit of a common user-interface and ease of translation between popular microcontroller (MCU) architectures.

Increasing Demand for Software Tools

Widespread use of powerful and highly integrated development tools designed for embedded applications have provided software engineers with improvements in terms of both programmer efficiency and flexibility. Even simple 12-bit RISC architectures such as Microchip's PIC16C5x for example, are supported by several C-Compiler manufacturers. Once written, high-level language (HLL) source code can be translated into a variety of MCU object codes using a target-specific, HLL compiler. The motivation is to allow for greater flexibility in hardware (such as a change in MCU), while minimising the effects of a total re-write in software. Integrated debuggers and simulators are also widely used to accelerate program development. For multi-processor applications use of a variety of compilers and software debuggers may be necessary in order to cater for the software development of each MCU. The provision of a common platform and one tool-set would clearly aid in reducing development time and save on tool costs.

Development Tool Trends

With the advancement of MCU architectures, many manufacturers have shifted the complexity of the hardware development tool from an intermediate board to firmware. Two examples of specifications that support test and in-circuit debugging include the Joint Test Action Group (JTAG) and Background Debug Mode (BDM). By using either serial, parallel or ISA connection to a PC, complex and often large in-circuit emulators (ICEs), can be replaced by a small pod that connects directly with the target's MCU/DSP via several port pins and a connector. Some manufacturers that adopt this type of development system include Texas Instruments and Motorola. JTAG has also entered the realm of programmable logic tools for CPLD and FPGA applications. Vantis' MACH CPLD and new FPGA line-up for example, will support JTAG.

Use of Very High-speed integrated circuit hardware Description Language (VHDL), on CPLD or FPGA is a significant step in merging semi-custom and custom logic with MCU and DSP architectures. It is debatable whether or not the application of VHDL will replace the multitude of commercial MCUs currently available with custom or semi-custom ASIC or FPGA variants. One thing is certain however and that is the effect VHDL tools are having on small start-up semiconductor manufacturers who can secure capacity for significant runs of "second source" devices. Other recent trends include the replacement of semi-custom MASK processors with OTP or FLASH memory equivalents and the use of in-system programming for boot-loading on the production line. This all adds up to a more flexible environment for the engineer who is relying on the state of the art development software to help get the job done, in many cases, yesterday!

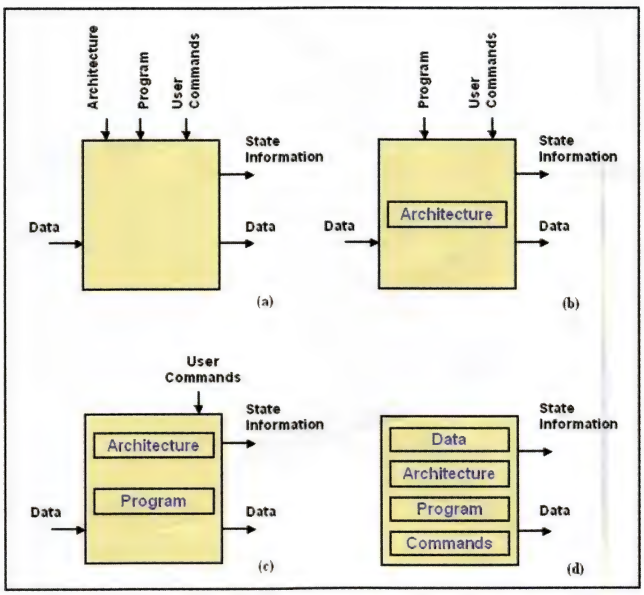


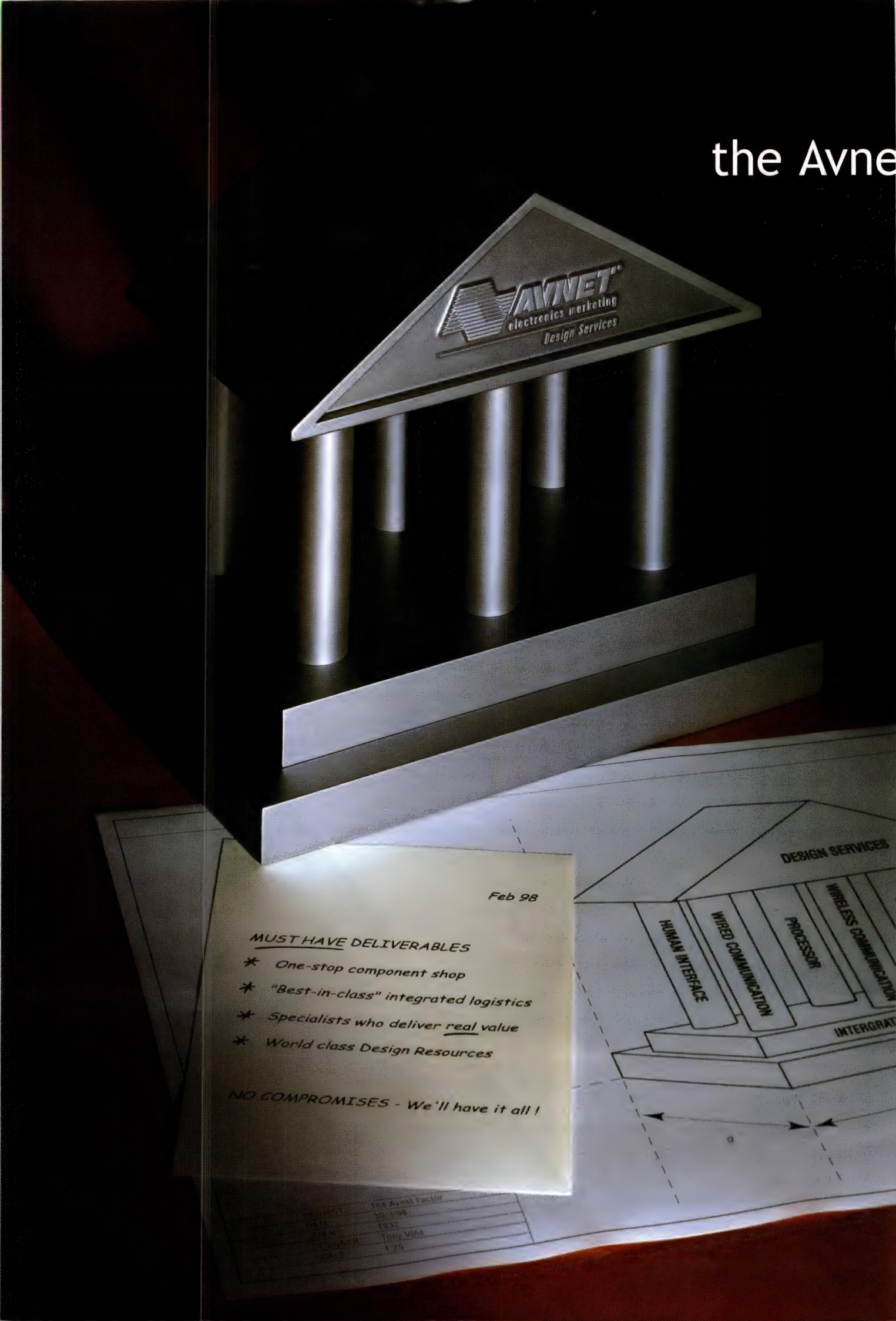
Figure 1. Simulator Models: (a) general; (b) architecture-specific; (c) program specific; (d) completely specified. (Siegell & Gross, 1987).

Based on the above comments, I believe that while the cost of commercial hardware development tools has dramatically reduced over the past 2 years, the cost of commercial software tools such as C-Compilers and simulators has remained relatively static and the gap appears to be getting wider.

From recent research, the answer to lower cost software tools appears to be re-useable software modules using Object Orientated Programming Languages (OOPL) such as C++. Such tools are breaking new ground for the software tool manufacturers however they have simply not yet been available for use in embedded applications. I predict that within a few years the balance of power will change and access to tool-set modules will allow embedded software and application development to be as easy as code generation now is for Windows applications.

Recent Research

Our design team has evaluated a great variety of software tools over the years. Although many tools from companies such as Hi-Ware and SDS have provid-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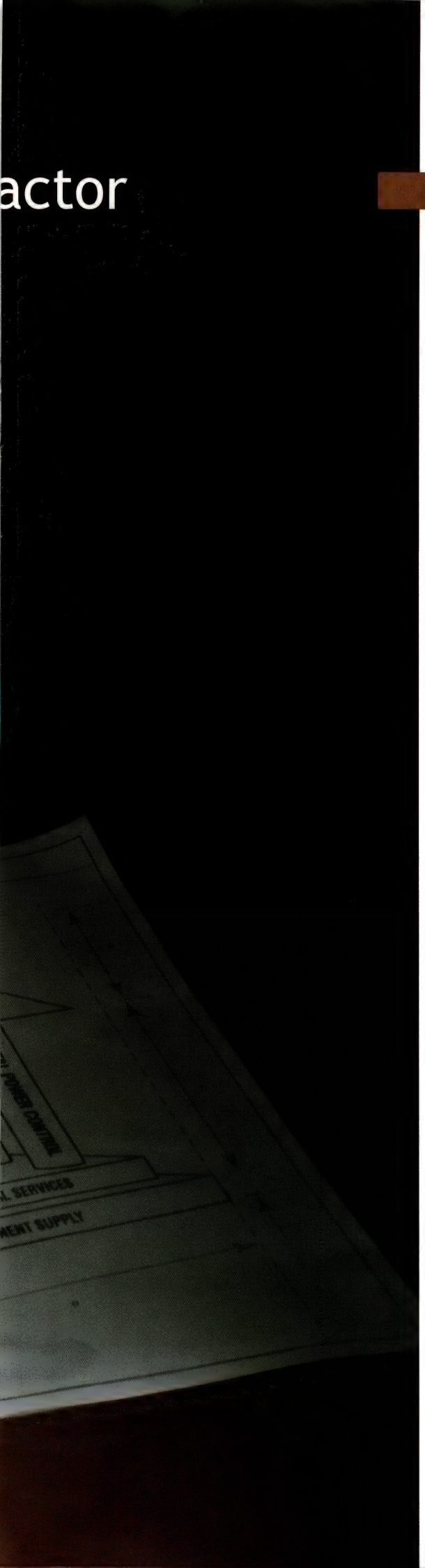

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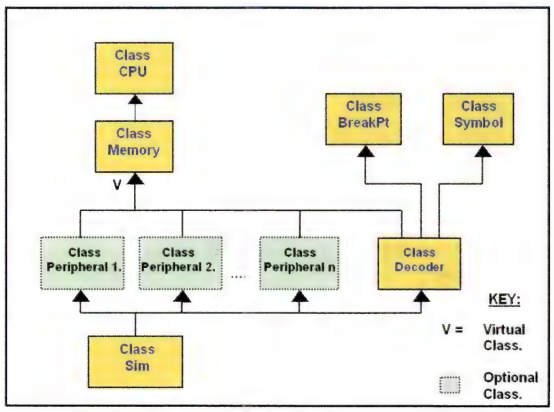

Figure 2. Class Hierarchical Chart for the Architecture-Specific Simulator. (Weddell, 1995)

ed a common GUI interface and C++ capabilities for a variety of target architectures, none have provided the means for creating a customised tool-set.

Research into re-targetable compilers as well as meta-assemblers and meta-simulators has shown how a single software tool can be used to aid development and economise on resources for use on a multitude of MCUs. More specifically, by using software simulation in the evaluation of new or existing instruction sets, specialised applications can now be tested with a variety of MCU architectures before a commitment to use a particular MCU is made. For example, Figure 1. shows the various classifications of MCU simulators. They range from the general type that defines an MCU's architecture, program and data as variables, to the completely-specified type that is used to benchmark new architectures.

Several years ago my research focused on providing a tool-set that was classified as a general type. Although the study focused only on MCU assemblers and simulators, the same principles could be applied to HLL compilers. The result was the development of a table driven meta-assembler to provide assembly code translation into nominated MCUs' object code and a code generator (general type), to create 8-bit, architecture-specific simulators. The platform used to develop and facilitate the manufacture of one's own tool-set was a popular PC based, C++ compiler. Another requirement was that the compiler also provide a set of application framework modules that included user-interface tools. Although created for a windowed DOS environment, porting to a graphical user-interface was also considered for a possible commercial version.

Essentially a code generator was used to build the data structures and functionality of a user defined, MCU core. This included the CPU, instruction decoder and memory classes. The simulation of on-chip peripherals required the user to derive new peripheral classes from virtual base classes. By linking pre-defined class libraries of internal peripherals, such as serial communications ports and A-to-D converters, the modelling of a complete MCU was greatly simplified. Figure 2 shows the hierarchical chart of the classes' used on the architecture-specific simulator.

Architectural information such as the instruction set definition is collected by a series of dialogue boxes. A database manages the instruction entries and provides full edit functionality. The adoption of an object-oriented design approach, and use of the C++ programming language allowed for greater flexibility in the simulation of integrated modules such as on-chip peripherals. Object oriented programming languages support polymorphic functions and this has been used extensively in order to simplify coding and maintain a generic system. For example, both 8-bit and 16-bit data transfers are supported through the use of simulated registers. An example, outlining the usage of the move_reg(src,dest) function for MC68HC11, is shown in Figure 3.

```
int Cpu::mov_reg(const unsigned char src, const unsigned int dest)
{
        unsigned char source = 0;
        switch ( src ) {
                case ACCA : source = regs.acca; break;
                case ACCB : source = regs.accb; break;
                default:    return FALSE;
        }
        switch ( dest ) {
                case PC : regs.pc = source;
                ...             ...
        }
        return TRUE;
}

int Cpu::mov_reg(const unsigned char src, const unsigned char dest)
{
        unsigned char source = 0;
        switch ( src ) {
                case ACCA : source = regs.acca; break;
                ....                ....
        }
        switch ( dest ) {
                case ACCB : regs.accb = source; break;
                ....                ....
        }
        return TRUE;
}
```

Figure 3. Examples of Polymorphic functions supported by C++ OOPL. (Weddell, 1995)

Future Considerations and Possible Limitations

Once the capabilities of such a system were proved, it was a relatively simple task to investigate the reasons why general purpose tools have not been available commercially. Firstly, these programming tools are currently the domain of software development tool manufacturers. The last thing they want is users having full access to their source code, however this attitude is changing. Secondly, a software engineer does not always require the implementation details of an MCU. In order to define your own instruction set or copy someone else's, a great deal of time and effort is required in order to fully define the architecture. This may not be warranted or justified. Lastly, existing commercial C compilers and simulators are more geared for performance and accuracy rather than being made for general purpose applications. The motivation for re-use of modules such as I/O, ADC and common instruction sets needs to be exacting as an enormous amount of time can be spent on tracking down tool bugs rather than application bugs!

Nevertheless, history has shown that the research tools of today will end up in the hands of developers tomorrow. If this prediction is right, fully debugged modular code for an MC68HC12 instruction decoder for example, could be evaluated with your external ADC plug-in. Transducers and LCD display modules could also be available that provide integration for a complete application simulation and development. After running the MCU benchmark code you may find performance needs to be increased. As a result a MC68HC16 module can be substituted and the simulation re-run without changing any of the C source code. Such are the tools of the research institutes!

Steve Weddell is the Engineering Resources Manager of Avnet Design Services based in Christchurch, New Zealand, tel: +64 3 366 0191, email design@avnet-pacific.com

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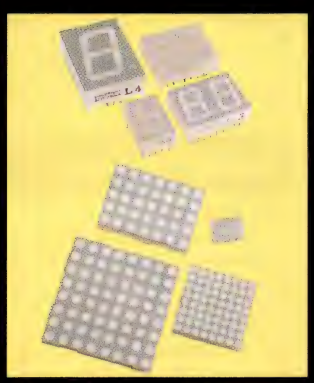

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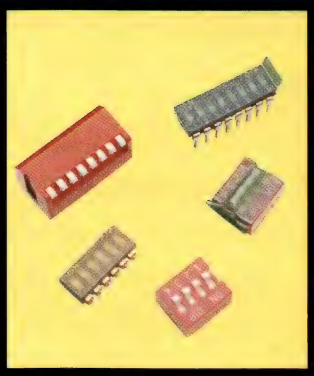

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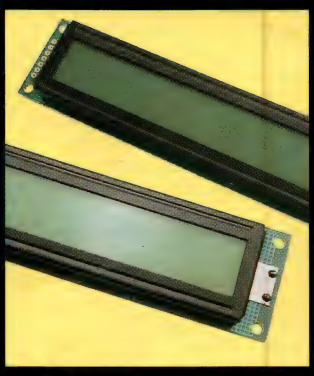

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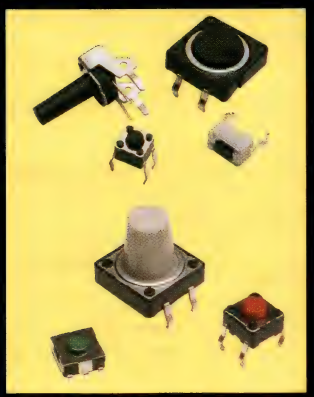

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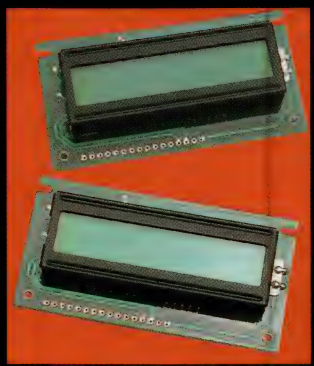

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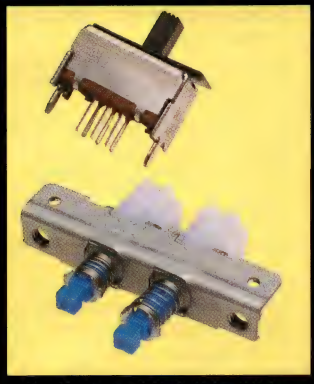

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National new products index

Welcome to the third *AEE* new products index, covering the three main electronics magazines, *Australian Electronics Engineering (AEE)*, *Electronics News (EN)*, and *What's New in Electronics (WNIE)*. Our thanks to EN and WNIE for their help in compiling this list. Products have been split up into 15 categories and are listed alphabetically within those categories by product description, followed by product name, distributor, magazine and issue. Where products appeared in more than one magazine, only one entry has been included.

General new products

8000, **Thytec** , WNIE Jun
1-2GHz low-noise amps, **EDS**, AEE Mar
282, **Mastatek**, WNIE Nov
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Amps – OPA681/2681, **Kenelec**, EN Jun
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Arb. func. gen. – AFG300, **Tektronix**, EN Jul
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Attenuator – PI-820, **EDS**, WNIE Mar
Audio power amps – One Chip Class-D, **STMicroelectronics**, EN Aug
Audio trans. – MZT-03A, **Panapex**, EN Jun
Automated chip programming – PP100, **Electro Optics**, AEE Dec
AWT390, **APCS**, WNIE Sep
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B'top fume exh. – FX-50, **Solder Static**, EN Feb
Bi-level DIN indicators, **Zatek**, AEE Jul
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Conductor – CS4390, **Braemac**, EN Jan
Conductors – TENAX-TT, **Edward Keller**, EN Oct
Control/sig. equip. – IP66, **NHP**, EN Jun
Controller – 68HC(7)05SB7, **Motorola**. WNIE Sep
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Converters, **Scientific Devices**, WNIE Apr
Converters – IESS-308/309, **EDS**, EN Mar
CPP-3794, **Thomson Env.**, WNIE Jan
C-controller – LP3100, **Dominion**, EN Mar
Crystal osc. – OXCO-4000, **Zatek**, EN Jul
CY7C955, **Braemac**, WNIE Mar
DAQ system – LogBook/300, **Scientific Devices**, AEE Jan
DC micro motors, **Erni**, EN Feb
DC servomotors – Minimotor, **Erni**, EN May
DCP01U, **Kenelec**, WNIE Oct
Devices – MAX4322, **Veltek**, EN Nov
Dig. latch ass'y – HE-3135, **Adilam**, EN May
Diodes – HBAT-5400/HSMS-2700, **Avnet**, AEE Nov
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Digital manometers – 2000, **Zenology**, EN Nov
Digital scopes – N15102, **Nat. Inst.**, EN Jul
Digital scope – DL708, **Yokogawa**, EN Jan
DIN panel meters, **Micromax**, EN Jul
DL1500, **Yokogawa**, WNIE Jan
DMM – 7555 DMM, **Yokogawa**, EN Nov
DMM – 80, **Philips T&M**, WNIE Apr
DMMs – TX-DMM, **Tektronix**, AEE Jul
DMM access. – TL80/1, **Philips T&M**, AEE Sep
DMM module – VM2710, **Racal**, WNIE Jun
DMM-10M/DMM-20M, **DGE Systems**, WNIE Apr
DPO, **Tektronix**, WNIE Jun
DT2820, **Total Turnkey Solutions**, WNIE Feb
DTMF option – RT-1M, **Amber Technology**, AEE Sep
Dual purpose load cell, **Hi-Weigh**, AEE Feb
EDAS VI, **Kenelec**, EN Apr
ES meter – 282 Handheld, **Zenology**, EN Oct
EMC test – BestEMC, **Westek**, EN Sep
EMC testing – Profline, **Westek**, EN Sep
EMI receiver – PM9000, **Cons. Techn.**, EN Sep
Ethernet link tester – LanMaster Model 20, **Cable Check**, AEE Jun
Eth. testing – DominoGigabit, **W&G**, AEE Nov
Eth. troubleshooting – Gigabit, **W&G**, AEE Sep
Extended Owl, **Axiom**, WNIE Jan
F/O IR thermometer – M680, **W&B**, AEE Jul
Field analyser – EFA-2/3, **W&G**, EN Jan
Field monitor – FM5501, **RFI Ind.**, AEE Sep
Field probe – PRS2000, **Cons. Tech.**, WNIE Sep
Flow monitors, **Micromax**, EN Sep
Flowmeter, **AMS Technical**, EN Jan
Freq. counter – FC2002, **Computronics** , AEE Feb
Gapman, **Applied Measurement**, WNIE Apr
Gas gauge IC – bq2013H, **Reptechnic**, AEE Sep
Gas purity analyser – 4100B, **Pryde**, AEE Feb
GaugeLink, **Microconsultants**, AEE Nov
Geartooth sensor – HE6151/2, **Adilam**, AEE Apr
GSM 900MHz – 2967, **REC Inst.**, EN Jan
Guided probe – SR5000GP, **Racal**, WNIE Mar
Handheld inst. – CDM7231/CVT660, **Cabac**, AEE Mar
Hardware mon. – ADM9240, **An. Dev.**, EN May
Harm. analysis – AM-56, **Axiom**, WNIE Feb
High-res IR camera – SU320, **Lastek**, AEE Mar
Hitester – 3331, **Nilsen Technologies**, EN Oct
Hitester – 3540 Mohm, **Nilsen**, WNIE Sep
HP 81100, **Hewlett-Packard**, WNIE Nov
HP 82350A, **Hewlett-Packard**, WNIE Jun
Huntron tracker – TR 210, **Tektronix**, WNIE Apr
IFMR, **Pryde**, WNIE Jun
Imm. test – UCS500M, **Cons. Tech.**, AEE Oct
Imm. test – PMM 6000S/10, **Cons. Tech.**, EN Aug
In-circuit tester – HP3070 3, **H-P**, AEE Jul
Instruments – DSA, **National Inst.**, EN Nov
Insul. testers – 2406-34, **Yokogawa**, AEE Sep
Intell. DC meter – PAXD, **Pryde**, AEE Apr
Ion meter – 7330, **Quasar**, WNIE Apr
ISDN office emulator – TAS-DAT 2502A, **Tech Rentals**, AEE Sep
ISDN tester – IBT-20, **W&G**, EN Sep
JTA, **Philips T&M**, WNIE Jul
LA314/H, **Philips T&M**, WNIE Jul
Laser power meter, **Stantron**, EN Aug
LC564A/84A, **Philips T&M**, WNIE Nov
Leakage – 3155-01, **Nilsen**, WNIE Jul
Leakage testers – 310, **Yokogawa**, AEE Oct
LG OS-9020, **Nilsen Technologies**, WNIE Nov
Load cell – PT 1250, **Hi-Weigh**, EN Jul
Logic analysers – LA1000, **Wavecom**, AEE Oct
Logger – Elite, **Axiom Data Logging**, WNIE Mar
Long sensors – QMT42, **Micromax**, WNIE Sep
LSA1000, **Philips T&M**, WNIE Jul
Mainframe OTDR – MTS 5200, **Sc. Dev.**, EN Mar
Manuf. tester – Spectrum 8800 VXI, **W&G**, EN Jul
Mask tester, **Philips T&M**, EN Mar
Maxitrac Voice, **Nilsen Tech.**, WNIE Jul
Memory recorder – 8835, **Nilsen**, AEE May
Metcal Plus v5.0, **Philips T&M**, WNIE Aug
Meter – 824, **Vipac**, WNIE Aug
Meter – PM390, **Fastron**, WNIE Aug
Meter kit – CO-220/CO-205, **Philips**, EN Nov
Meters – CEL400, **Stantron**, WNIE Apr
Min. load cell – SML, **AMS Technical**, EN Jul
Model 39, **Scientific Devices**, WNIE Feb
Modular EMC test – 2050, **Westek**, EN Jul
Monitoring unit – IUM-10 U Interface, **Wandel & Goltermann**, EN Nov
Monitors, **Samsung**, EN Mar
MPEG decoder, **Rohde & Schwarz**, AEE Nov
MPEG/DVB – MTS200, **Tektronix**, WNIE Jan
Multi product cal – 5520A, **Philips**, WNIE Mar
Multifunc. calib. – MC5, **AMS Tech**, AEE Nov
Network tester – CTS 850, **Tektronix**, AEE Mar
Nuero Check 4.0, **Total Turnkey**, WNIE Apr
Oscill. recorder – OR300, **Yokogawa**, AEE Jul
Oscill. probe – Model AP033, **Philips**, EN Jul
Oscilloscope – LS8050, **Stantron**, WNIE May
Oscilloscope, **BJE Enterprises**, AEE Jun
Oscilloscope probes – AP015/DA1820/2/50/5, **Philips T&M**, AEE Mar
Oscilloscopes, **Philips T&M**, EN Feb
PCI-based DSAs – NI4551/2, **National Instruments**, AEE Oct
Phone tester – 4100S, **Sc. Dev.**, EN Mar
PL-P, **Nilsen Technologies**, WNIE Nov
Portable scope – 300C, **Wavecom**, AEE Jun
Portable TEM cell – XCELL, **Sc. Dev.**, AEE Jul
Power meas. – Easypower, **Sc. Dev.**, EN Aug
Power meter – KI7600-Ge, **Kingfisher**, AEE May
Power meter – K17600-H3, **Kingfisher**, WNIE Jun
Power meter – K17600-H4, **Kingfisher**, WNIE May
Power meter – Model 3331, **Nilsen**, AEE Sep
Power meter – 3166, **Nilsen Tech.**, AEE Feb
Pre Model 5111, **AMS Technical**, WNIE Sep
Pressure sensors – SM5712/52, **Braemac**, AEE Jan
Pressure transducers – 212FT, **Pryde**, EN Nov
Pressure transd. – Sensit, **Amalg. Inst.**, EN May
Pressure transm. – P30/P31, **Philips**, EN Jul
Probe – AP033, **Philips T&M**, EN Oct
Probes – HVP40/HVP40M, **Enerco**, WNIE Oct
Proc. calib. – DPI610, **Davidson**, AEE Aug
Process indicator – DI35, **Innovec**, AEE Jun
Proximity sensor – CA40, **Micromax**, EN Jun
Proximity sensor – Q14, **Micromax**, EN Jul
Proximity sensors, **Micromax**, EN Nov
Proximity sensors – Uprox, **Micromax**, EN Mar
R2D1, **Recordata**, WNIE Sep
Radiation hazard meters – 20/30/50/H500, **Advanced Systems**, EN Jan
Rad. hazard meas. – 2001, **Adv. Sys.**, EN Nov
RCL meter – PM 6306, **Philips T&M**, EN May
RF emissions/immunity tests, **Westek**, EN Jul
Scopemeter – ISO 124, **Kenelec**, EN Sep
SCP-2K0, **Computronics** , WNIE Oct
SDH/SONET test – ST2400A, **Tektronix**, AEE Oct
SDI option, **Tektronix**, WNIE Feb
SEFELEC SMG, **Nilsen Technologies**, EN Nov
Sensorex SX27, **AMS Technical**, WNIE May
Sensors – Q23/QH23, **Micromax**, EN Apr
Sensors – OPB715, **Logic 4**, WNIE Sep
Series analysers – AN1800, **Vicom**, WNIE Jan
Signal isolator – S1231, **APCS**, WNIE Sep
Signal scout – RFM151, **Tektronix**, WNIE Feb
Simulate mains – PCR/L, **Emona**, EN Jan
Simulator – 3410, **Maser**, EN Mar
Temp monitor – ADM1021, **Analog Dev.**, EN Aug
Spec. an. – R3131, **Rohde & Schwarz**, AEE Apr
Spectrum analyser – ULIS U3661, **Rohde & Schwarz**, EN Oct
Spectrum analysers – IFR 1800, **Nilsen Technologies**, EN Jan
Speed-ee, **Digital Graphics**, WNIE Apr
Storage scope – LA354, **Philips T&M**, WNIE May
Strain meas. – WBK16, **Sc. Dev.**, AEE May
Supply monitor – ADM 9690, **An. Dev.**, EN Feb
Supply datalogger – Polylogger Q, **Testing & Certification Aust.**, AEE Mar
System tester – DWDM, **W&G**, WNIE Jun
TDS600 C-Version, **Tektronix**, WNIE Nov
Temp sensors – NTC, **Philips**, EN Feb
Temp test – MK, **Computronics** , WNIE Mar
Test systems – ME9719A, **Anritsu**, EN May
TETRA analyser – 2310, **REC Inst.**, AEE Jun
TETRA test set – 2968, **REC Inst.**, WNIE Feb
Thermometer – Hydra II 2620T/35T, **Philips T&M**, AEE Sep
Time domain reflectometer – TV90 Cablescout, **Tektronix**, EN Aug
TLA 700 V2.0, **Tektronix**, WNIE Jul
Trackman Marble+, **BJE Enterprises**, WNIE Jun
Transmission tool – Signal Scout RFM 151, **Tektronix**, EN Feb
Transducers – 204D, **Pryde**, AEE Jun
Transmitters – Uniflex-R/T, **Philips**, EN Jul
TS-5500, **H-P**, AEE Jun
UnderV sens. – MC3346465, **Veltek**, AEE Oct
Upgrade – Dataman-45, **Dig. Graph.**, WNIE Jun
USB data acquisition, **Kenelec**, AEE Jun
USB-based inst. – NI4060, **Nat. Inst.**, AEE Jul
Vector network analysis – ZVC/ZVCE, **Rohde & Schwarz**, AEE Sep
Video test – VideoTracker, **Colourview**, AEE Sep
VIP96 Plus, **Nilsen Technologies**, WNIE Oct
VIPS, **Nilsen Technologies**, WNIE May
Voice logging recorder – Maxitrac, **Electrodata**, AEE May
Waveform generator – 3171, **Racal**, EN Mar
Waveform recorder – 8806-01, **Nilsen**, WNIE Oct
WDM tester – MS9715A, **Anritsu Wiltron**, EN May
Wedge probe adapter, **H-P**, EN Aug
Wireless network testers – T-BERD 2207, **Racal**, EN Mar

Wide-spectrum power meter

Nilsen Technologies have released the Hioki 3193 Power HiTester, a wide band, 6 channel power meter. It permits the simultaneous measurement of three-phase inputs and outputs, or the analysis of several single phase lines.

Optional features include external input unit for motor power measurement, harmonic and flicker analysis. Dual power integration for positive and negative power flow provides enhanced analytical capability. It has a 3.5" floppy drive and GPIB/RS232 interface with an optional printer.

Further enquiries
www.aee.com.au
Enquiry number: 1647

High-bright graphics display

Available through Amtex Electronics, Planar Systems has released the EL320.240.36-HB thin film electroluminescent (EL) as an alternative to industry standard quarter-VGA LCDs. Utilising Planar's proprietary integral contrast and brightness enhancement technology it achieves image quality without the use of expensive filters.

The display consists of an EL glass panel and control electronics. It can be interfaced using standard 4-bit LCD control signals. Other features include sunlight readability, wide operating temperature range, locking connector, low EMI emissions, wide input voltage, wide viewing angle, low power consumption, and analogue dimming.

Further enquiries
www.aee.com.au
Enquiry number: 1645

Portable flash file system

Available through Alfa-Tek Australia, Datalight FlashFX software makes flash memory appear to the operating system and applications as a disk drive. It can also be used to make flash memory emulate EEPROM or RAM. Written in portable ANSI code with all modification code designated, with the FlashFX Porting Kit, it can be ported to many operating systems and microprocessors.

Reducing code overhead and data requirements, it provides more flash memory and RAM for applications and data storage. It also has write interruption recovery to prevent corruption of the flash disk if a battery fails, power cord is disconnected or the flash media are removed while writing data.

Further enquiries
www.aee.com.au
Enquiry number: 1646

FET bias controller

GEC Electronics Division has released the ZNBG3110/11 Zetex FET bias controller IC which it claims reduces the component count of satellite dish low-noise blocks by as much as 40. It is suitable for the bias generation needs of a GaAs and HEMT FETs, polarisation control, and 22kHz tone detect.

It features a low-current, negative-rail generator capable of controlling up to three FETs. It manages FET drain current setting by the introduction of a single resistor. Users have a choice of drain voltage with the ZNBG3110 yielding a drain voltage of 2.2V and the 3111 giving 2V.

Further enquiries
www.aee.com.au
Enquiry number: 1648

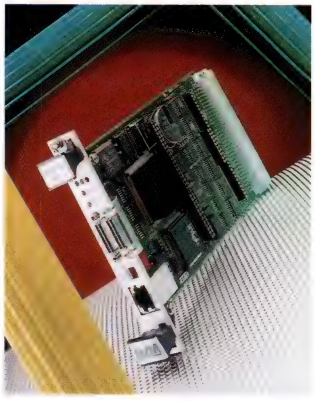
Data acquisition system

Scientific Devices Australia has made available IOtech's LogBook/300, an intelligent PC-based data acquisition system that can operate without an attached PC. The standalone system contains an embedded 486 processor and is capable of executing programs and storing acquired data using off-the-shelf, removable PC-Card memory.

The system combines sampling, at speeds of 100kHz, and capacity for more than 450 analogue and digital channels. Basic features include a 16-bit, 100kHz A/D converter, 40 digital I/O lines, 4 frequency inputs, 2 pulse train outputs, and 4 optional high-speed 16-bit outputs. It is also expandable up to 256 analogue I/O channels and 208 digital I/O lines. These options permit the measurement of a variety of signal types, including volatge, thermocouple, RTD, strain gage, accelerometer, load cell, current, frequency, pressure, vibration, etc.

Further enquiries
www.aee.com.au
Enquiry number: 1649

Ruggedised 68040 CPU



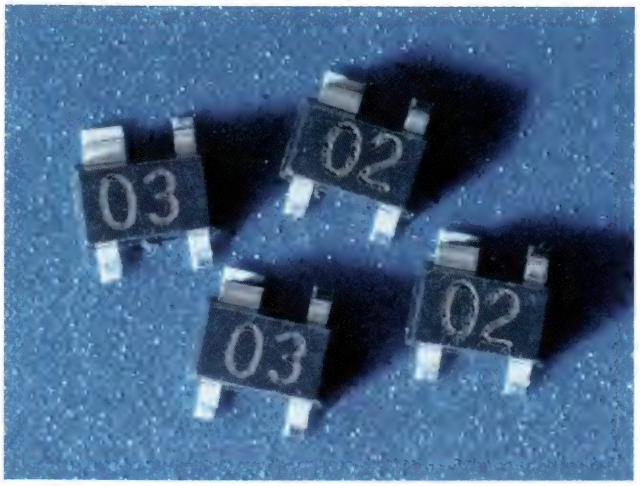
Available through Unitronix, the BVME4500, the latest addition to BVM's family of VMEbus modules, is based on a 33MHz 68040 processor. Its common design with the other members of the family allows for easy applications migration between systems. Offering performance in a 3U form factor, it is also available in an extended temperature version for use in hostile environments.

The BVME4500 support a wide choice of memory options, all dual ported to the VMEbus. On-board are 2Mbytes of 32-bit wide non-volatile SRAM and 2 Mbytes of 32-bit boot sector flash EEPROM. The memory is expandable to 16Mbytes of flash and 96 Mbytes of DRAM. The Boot Sector flash can be remotely programmed from the VMEbus.

Two RS232 serial ports and a 32-bit DMA driven 10BaseT Ethernet port are provided, with all connections via the front panel. Both the OS-9 and VxWorks real-time operating systems are ported to the board.

Further enquiries
www.aee.com.au
Enquiry number: 1650

Bipolar junction transistors



Hewlett-Packard, through Avnet Electronics Marketing, has introduced isolated-collector silicon bipolar junction transistors, the first HP devices fabricated using a 25GHz transition frequency. The HBFP-0405 and HBFP-0420 are supplied in the SOT-343 surface-mount plastic package.

At 1.8GHz, the HBFP-0405, optimised for low-current operation at 2mA with 2V bias, provides a minimum noise figure of 1.2dB and associated gain of 18dB. With 5mA bias it provides +5dBm output power.

With a bias of 5mA at 2V, the HBFP-0420 provides a minimum noise figure of 1.1dB and associated gain of 17dB; with 20mA bias, it provides +12 dBm output power — all at 1.8GHz. In many applications, the HBFP-0420 can be used without impedance matching at the input.

The transistors have a self-aligned, double-poly-silicon, buried-layer diffusion process, minimising base-to-collector feedback capacitance and base resistance. The design puts the transistor collector on the top side of the chip, reducing parasitic base-to-collector capacitance.

Further enquiries
www.aee.com.au
Enquiry number: 1592

Bootstrap-powered optocoupler

Veltek has released Hewlett-Packard's HCPL-314J, a 0.4A output, half-bridge gate drive optocoupler designed specifically for lower-power motor-control-inverter. The voltage and current provided also makes it suitable for lower industrial applications.

With an operating current of less than 3mA, it is possible to power the optocoupler using a bootstrap technique, eliminating the need for costly, isolated power. It features two channels integrated in one surface-mountable, industry-standard SOIC-16 package, requiring up to 50% less board space than conventional, single-channel 8-pin DIP optocouplers.

Propagation delays between channels are matched to within 0.7µs, allowing designers to minimise the "dead time" in an inverter and maximise its efficiency.

The HCPL-314J offers an alternative to high-voltage integrated circuits. With superior galvanic isolation, it supports a microcontroller that is fully isolated from the high-voltage portion of the inverter, protecting the user from shock hazards.

Further enquiries
www.aee.com.au
Enquiry number: 1589

PCMCIA adapter

Interworld Electronics has released Quatech's DSP 200/300 PCMCIA adapter. It is a PC-Card 2.1 compliant Type-II PCMCIA adapter implemented with 16550 UARTs and 16 byte FIFOs. It provides two additional fully independent asynchronous RS-422/485 serial interfaces.

All ports share one PCI interrupt and channels are addressed in either the standard COM port or a continuous 16-byte I/O block. The card solves the problem of extra serial ports as it provides two ports on a single PCMCIA card, and it can be connected using the PCMCIA drives on notebook computers.

It is suitable for heavy multi-tasking industrial environments. NASA uses the DSP 200/300 card on the shuttle for relaying and collecting data. The serial ports are also used as a payload interface on the International Space Station.

Further enquiries
www.aee.com.au
Enquiry number: 1590

Embedded controllers

Available from Braemac are IBM's PowerPC 403GA, 403GB and 403GC 32-bit RISC embedded controllers, which combine performance and functional integration with low power consumption. On-chip caches and integrated device control functions reduce system chip count and design complexity while improving system throughput.

These embedded controllers execute programs at sustained speeds approaching one instruction per cycle. Their RISC processor cores are tightly coupled to internal 2kB instruction and 1kB data caches, reducing overhead for data transfers to and from main storage. Instruction queue logic minimises pipeline stalls by managing branch prediction, branch folding and instruction prefetching.

The PowerPC 403GC includes an integrated MMU featuring a fully associative TLB. Each entry provides translation for a memory page, which can be one of several sizes.

Further enquiries
www.aee.com.au
Enquiry number: 1591

Rubber keypads

DENISTRON now offer a rubber keypad design and manufacture facility. These are conductive rubber switch pads which can be connected to either new or existing designs. The keys can be made to match both colour and tensile resistance requirements.

Moulded to fit any shape or colour, available with backlighting or even luminous, the keypads can also be screenprinted on the top of each key.

Further enquiries
www.aee.com.au
Enquiry number: 1599

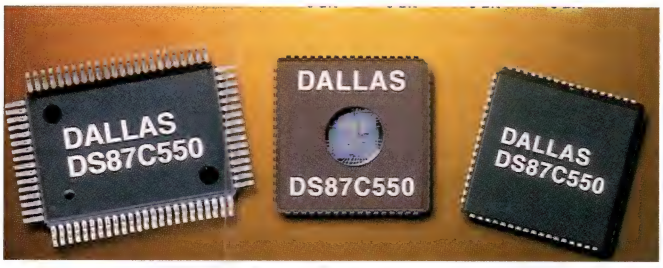
Bootlace crimper

0Cabac has released the Crimp-R automatic strip form bootlace terminal crimper. The tool allows for insertion of the terminals utilising the handy cartridges, which feature colour coding for identification of terminal sizes.

The tool will automatically crimp and cut each terminal free from the strip in one operation. The terminals are available in sizes 0.5mm^2 to 2.5mm^2 and come in both strip and reel form. The strip form allows for up to 40 crimps to be done without any re-loading of the tool cartridge. The reel form allows for up to 200 crimps before reloading.

Further enquiries www.aee.com.au
Enquiry number: 1640

High speed microcontroller



Veltek has released the Dallas DS87C550 EPROM high speed microcontroller with an on-chip analogue to digital converter and pulse width modulation. The device surrounds an 8051-type processor core with additional circuitry to meet a wider variety of real-world applications.

The company says the device executes 8051 instructions up to three times faster than the original 8051 architecture at the same crystal speed. This improvement comes from an efficient instruction set that eliminates wasted clock and memory cycles.

Further enquiries www.aee.com.au
Enquiry number: 1644

For more information on any of the products or advertisements in this issue, visit the *AEE* website *www.aee.com.au*

BiCMOS rail-to-rail op amps

Braemac has released two single supply, rail-to-rail, op amps from STMicroelectronics — the TS942 and the TS951. Both devices are built with an advanced BiCMOS process that allows dynamic performance and power consumption to be optimised for different applications. The TS951 is aimed at mobile equipment requiring low power consumption and a small IC footprint. The TS942 is aimed at battery-operated industrial and consumer products.

Further enquiries www.aee.com.au
Enquiry number: 1593

High-speed optoisolators

Veltek has released a family of dual-channel bi-directional optoisolators from Hewlett-Packard. They are capable of data rates of up to 1MBd and come in the compact SOIC-8 surface mount package. Each device consists of two separate channels to achieve full-duplex data-transmission capability within a single device.

Further enquiries www.aee.com.au
Enquiry number: 1595

PCB screen and stencil cleaner

Axion has released the Soniclean Ultrasonic Cleaner for cleaning screens and stencils. It is compatible with fully aqueous and semi-aqueous cleaning chemicals and reduces manual scrubbing and damage. It is suitable for stencils up to 29in x29in. The Soniclean uses only 40 litres of cleaning fluid and has a sludge collection zone to prolong the useful life of the fluids. It also has a small surface footprint to reduce fluid evaporation.

Further enquiries www.aee.com.au
Enquiry number: 1596

Deskew IC

Available through Logic 4, Vitesse Semiconductor Corporation has released the VSC6250, a 1Gb/s deskew IC designed for use in automatic test equipment targeted at the Rambus and high speed memory test markets. Incorporating the deskew and fanout functions on a single IC reduces board space requirements.

Further enquiries www.aee.com.au
Enquiry number: 1598

Circular connectors

Amphenol has released the C091A and C091D series of circular connectors designed to reduce interference. They consist of a two part metal shell that allows the possibility of connecting the shielding capacity to the cable strain relief. Interferences which enter from the conductor side can be compensated by filtered receptacles.

Further enquiries www.aee.com.au
Enquiry number: 1642

Desktop EDA applications

Available through EDA Solutions, OrCAD has released version 9 of its entire line of desktop EDA applications. The new version features OrCAD and MicroSim products, integrated via the new OrCAD interchange architecture. All of the products have been enhanced, including OrCAD Capture and Capture CIS, OrCAD PSpice and PSpice A/D, OrCAD Express, OrCAD Layout and Layout Plus and Layout Engineer's Edition. In addition OrCAD Express Plus has been added to the line.

Further enquiries www.aee.com.au
Enquiry number: 1643

Power drawer connectors

AMP have released a family of mixed power drawer connectors designed for pluggable power supply applications. Their are four connector sizes available, covering the current range of 5A to 200A with power ranges up to 1200W.

Mixed circuit sizes in each of the connector sizes allow for signal/power versatility. Optimised connector size versus noise segregation allows for ease of design in signal integrity while still providing significant power capabilities.

Further enquiries
www.aee.com.au
Enquiry number: 1639

No EMI temperature systems

Scientific Devices Australia has released Nortech's NoEMI fibre-optic temperature systems. The HandyFlex is a battery powered, portable, single-channel instrument. The red LED display provides °C and °F temperature readings and automatically adjusts display intensity to ambient light conditions.

The Multiplex is designed for dedicated industrial applications. It has 16 or 32 channels and is available in either a 19" rack-mounted assembly or a table-top version. It comes bundled with NoEMI Assistant software for real time data processing.

Further enquiries
www.aee.com.au
Enquiry number: 1597

Silicon amplifiers

Avnet Electronics Marketing has released three silicon monolithic amplifiers in the ultra-small, 6-lead SOT-363 package from Hewlett-Packard. The INA series amplifiers are targeted at buffer and driver amplifier applications in the 900MHz, 1900MHz and 2400MHz wireless-communications markets.

All three of the SOT-packaged silicon and GaAs RFIC's operate from +3V and incorporate all bias-regulation circuitry on chip.

These amplifiers are built with HP's Isolated Self Aligned Transistor (ISOSAT) process. They are cascadable gain blocks featuring high insertion gains and low noise figures.

Further enquiries
www.aee.com.au
Enquiry number: 1594

Out of the Blue

With the purchase of IBM's Wangaratta manufacturing facility and Alcatel's Liverpool plant, Bluegum Technology is now the largest contract manufacturer in Australia. Its moves surprised many people within the industry and the company has been a talking point. Bluegum's founders Paul Zuber and Ned Strong spoke to AEE.

"These things always appear to be overnight," says Bluegum CEO Paul Zuber. "People ask, where did you come from? But in fact, Ned and I have been here for about two to three years putting Bluegum together, both coming back and forth and living here. And I think that experience convinced us there was a great opportunity here."

Sales and marketing director Ned Strong agrees. "From my background in telecommunications and Paul's background in software, we knew of Australian innovations, and Australian companies, and investment that the government had made in telecommunications here through Telstra. And that was appealing because it would suggest that there might be some good opportunities to commercialise technology here."

Bluegum's Paul Zuber (left) and Ned Strong.

The pair found both federal and state governments supportive of their venture. "They thought it made a lot of sense to have something on that scale because that way it would be globally competitive, it would keep industry here and it would attract some from offshore," says Zuber. "From the industry perspective, it's been a bit of a new concept on this scale so there's been a lot of education needed."

Although contract manufacturing in the electronics industry has been around since the 1960s, it has boomed in recent times as companies the world over decide to focus on the core parts of their business and hand the rest over to contractors. "You just cannot do everything extremely well," says Zuber. "We can't. There's things we partner with because we find other companies can do it better than we can. So I think that's really what's driving a lot of this."

He scoffs at the suggestion that contract manufacturing is best suited to simple products. "I think that's a pretty old view in the industry. When the industry first started, it was for fairly simple things, simple boards and lower complexity products. If you look at the business today, it's a hundred billion dollar business globally, growing at 30% a year. It's not simple products."

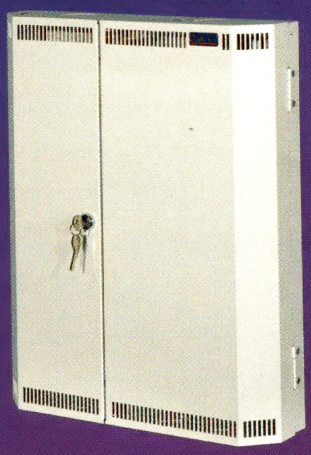
Asked if he thinks there's any limit to the growth of contract manufacturing, Zuber says: "If you look at the total available market it's well over a trillion dollars so the estimates range between 10% and 15%. That's pretty low for an industry. And in Australia, if you say the market's $8 billion and a billion's being served today, again very, very low penetration. There are estimates the market's penetrated 20% maybe in some other parts of the world. So Australia is below that and has a long way to go."

While they're always on the lookout for other facilities here and overseas, they have no plans for major purchases in Australia in the near future. "The two facilities we have have the experience and skills sets associated with the two biggest parts of the industry both here and worldwide, which is IT and telecomm," says Strong. "So you have to ask yourself why else you'd consider the purchase of a facility here if you're already in the two biggest sectors. Other sectors that we serve, like automotive, we can serve from the existing facilities, and the same with medical or defence or gaming. Because most of those other industries utilise base level skills out of the telecomms and IT industries."

They do sound more interested in an Asian purchase, particularly for manufacturing established high-volume products at low cost. "Engineering skills are very high here and the cost of engineers is relatively low by developed world standards," says Strong. "So that's good news for Australia because it means you have a good reason for customers to choose to build new products here. When you grow the volume to a certain point and production stabilises, you then move those products offshore."

Zuber says that in the US in the mid eighties, everyone thought the manufacturing would go to Mexico and Asia. "But if you fast forward to 1998, seven of the top ten contract manufacturers are North American-based. They have plants around the world but they're headquartered in the US and they're doing exactly what Ned was saying."

And the Asian crisis hasn't dampened their enthusiasm a bit. "The market's still growing," says Strong. "We're fortunate in that we weren't serving the parts of Asia which were hit extremely hard because some of the volumes dropped to almost zero. You look at a place like Indonesia with a couple of hundred million people and how much investment they're making, even in bad times, in telecommunications/infrastructure products. You look at the growth projections for the rest of the world and clearly it's going to be Asia for a long, long time to come. This Asian crisis is really a temporary blip."



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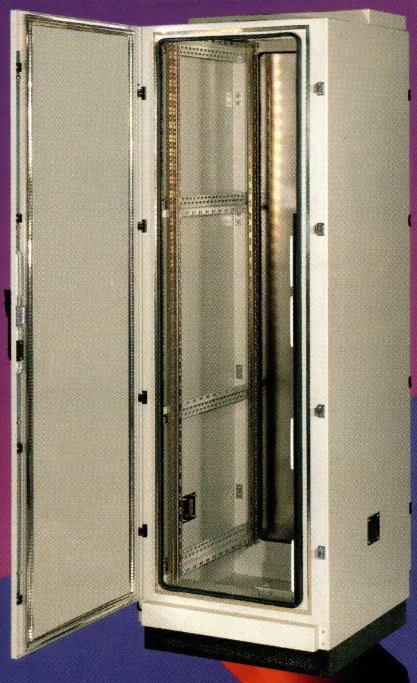

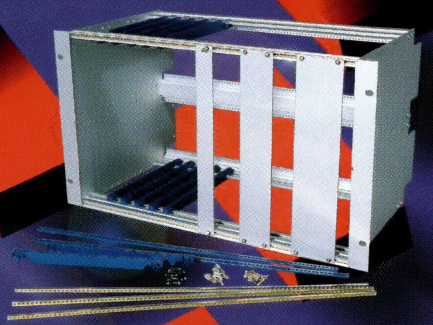

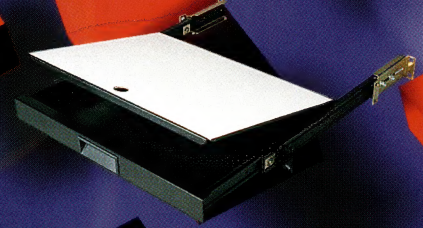

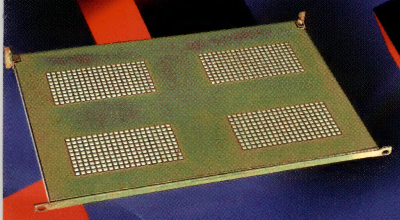

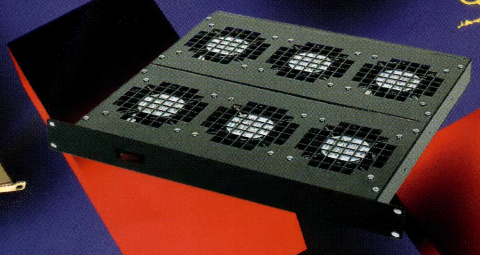

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